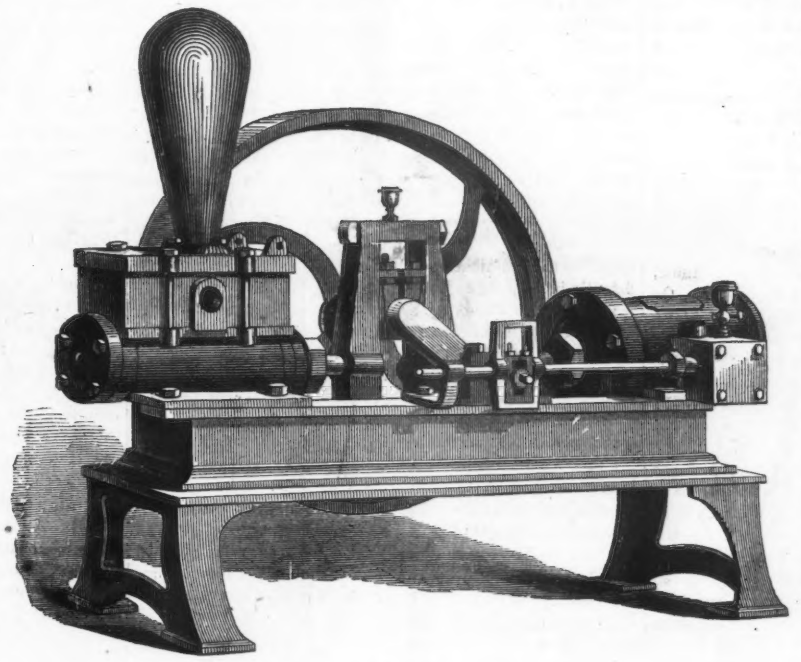
THE ENGINEERING AND MINING JOURNAL.

VOL. X.—NO. 25.—THIRD SERIES.] NEW YORK, TUESDAY, DECEMBER 20, 1870. [SINGLE COPIES 10 CENTS.

Steam Pump, Hand Pump and Steam Engine.

IN many cases, a machine which is capable of being employed in a variety of ways presents great advantages over one capable of performing a single kind of work, and that, too, only through the agency of a particular motive power. The value of such a machine is especially great in a new country, where either from a lack of capital or some other equally good cause it is impossible for everybody to have machines of various kinds, each of which shall be always ready to perform its particular work. The expedients to which the American people have resorted to overcome difficulties of this nature are notorious throughout the world. Given the requisite capital and time, no astonishing amount of genius is necessary to construct a machine which shall be capable of performing good work of a certain kind; but it is well known that cases frequently arise when it would be of the greatest possible value to be able to modify a machine in such a way as to enable it to perform another kind of work, or at least to perform its appointed work by means of another kind of motive power. This requires either remarkable skill on the part of the designer of the machine, or great ability and quickness in the adaptation of means to ends on the part of those using machinery.

The inventor and constructor of the pump represented in the accompanying engraving has taken this matter into his own hands, and has succeeded in making a pump which may be run either by steam or hand power, or in which the pump may be thrown entirely out of gear, and the steam power used for another purpose. In order to change from the use of steam to hand power, a simple lever is furnished by the manufacturer, which can easily be so attached as to work only the piston in the pumping cylinder. Such an attachment will be found extremely valuable in case of fire, or for filling boilers before steam has been raised. The strength, durability and simplicity of this pump are its chief recommendations. The valves are large and not liable to become choked, even when the pump is used for pumping viscous fluids. For the latter purpose, this pump seems to be particularly adapted. The owners of the large chemical works at Bull's Ferry, N. J., have recently made an examination into the adaptability of the different pumps in the market to the pumping of coal-tar, a well-known product of gas works, now used in large quantities in the arts for various purposes. As it comes from the gas works, this is a thick, heavy, slow-moving, semi-liquid substance, which has hitherto ordinarily been put into barrels at the works, and transported on carts or lighters to its destination. The company above alluded to has, however, built a steamboat for the express purpose of carrying to their works the large quantities of coal-tar which they consume. The boat contains an immense tank, and one of Mr. CLAYTON'S pumps has been selected to pump the material from the tank of the Gas Works into the boat, and afterwards into the reservoir at the company's works. The pump was, of course, especially constructed for the purpose, and works to the entire satisfaction of the purchasers. On one occasion, 825 barrels of coal-tar were pumped from the boat into the tank at the chemical works, through several hundred feet of pipe, in the short time of one hour and fifty three minutes. Many other substances which were formerly transported exclusively in barrels, are now occasionally forced for considerable distances, and with great economy, through pipes. As this method of transportation is, without doubt, destined to be much more extensively used than it is at present, it is probable that the demand for these pumps will be correspondingly augmented.



CLAYTON'S STEAM PUMP.

The Generating of Gas for Gas Furnaces—The Albion Steel and Wire Works, Sheffield.

THE opening of a new wire and steel works, by the well-known firm of GRAY & Co., of the Albion Works, Sheffield, brought together a large number of the leading gentlemen of the town and district connected with the steel and iron trades, whilst America was also represented on the occasion. In addition to the new wire mills, which are not excelled by any in the kingdom, there was the still greater attraction of being able to see at work the new patent system for generating gas to be used in the heating-furnaces, and of which report had spoken most favorably. The furnaces and apparatus were erected under the immediate superintendence of Herr Julius FRÖLICH, the patentee for "Improvement in Apparatus for Generating Gas to be used in Gas Furnaces." That the invention of Herr FRÖLICH is a really valuable one, and in every way eminently successful, was admitted on all sides by those who witnessed the admirable manner in which it worked at the new establishment, being entirely free from that stiffness so usual in new inventions until they have been in operation for some time. Not only was the flame of gas pure, but the temperature was high, and at the same time uniform. The fuel used in the production of the gas was ordinary small coal, whilst, apart from the economical advantages, it may be stated that the furnaces and their vicinity are quite cool, there is an entire absence of anything in the shape of smoke, and there is an appearance of cleanliness unusual at the ordinary furnaces. Considering the thorough satisfaction which the new system afforded to the many practical men who were present, and examined all that related to it in the minutest detail, there appears to be little doubt but the success of the invention, as seen at the Albion Works, will lead to its being generally adopted at the other establishments in the Sheffield district, as well as in other parts of the kingdom. Whilst there is, therefore, every reason to believe that Herr FRÖLICH will receive ample remuneration for his valuable invention, great credit is due to Messrs. GRAY & Co. for the confidence they have shown in adopting a system involving considerable outlay, but which they had not the opportunity of seeing in operation.

The apparatus for generating the gas is in itself simple, and consists of two fire-brick chambers connected at the bottom by a short flue. The first chamber contains the fuel in a powdered state, such as small coal, coal-dust, sawdust, or peat, and is fed from time to time at the top. The fuel descends by gravity, and is burnt by the aid of fan blast entering through a number of tuyeres near the bottom of the chamber. The gaseous products of this combustion pass through the flue into the second chamber, which is supplied from time to time by a door placed at or near the top with coke or large pieces of non-bituminous coal, so that all the gases resulting from the combustion in the first chamber are forced to ascend through a column of red-hot coke. The gas is thus converted into carbonic oxide, and is then ready for use, and the carbonic oxide gas thus produced may be burnt by either hot or cold blast, as the process to be carried out requires a higher or lower degree of heat. For this purpose the gases are led into the furnaces in which they are required to be used, which may be a reverberatory furnace, or a steam-boiler furnace, or other furnace, and air, either heated or cold, is admitted in suitable quantity to burn the carbonic oxide into carbonic acid gas. The same blowing apparatus which forces air into the fuel chambers may be employed to supply air to the furnace in which the gas is burnt. The principal objects obtained are the ensuring a complete utilization of all combustible matter contained in the fuel, the producing of a constant and pure gas flame of high temperature, whilst the cost of applying the apparatus is comparatively small, when compared with the advantages obtained. There is no complicated work, and the invention being free from elaboration in details, can scarcely get out of order. Indeed, its very simplicity is not the least recommendation of Herr FRÖLICH'S invention. The two chambers are constructed at the end of the furnace beyond the bridge, a short flue or passage connecting them together. The outer wall of the chamber is supported by the iron casing of the furnace, which is cast with a sill to receive it. The partition between the chambers is built upon a double arch of fire-brick, so that when the partition is burnt away at its lower part, the bottom arch may be cut out and rebuilt, without disturbing the work above it. The bottom of the flue or passage is built upon a cast-iron flap, which is supported by two latch-plates, either of which would support the flap, by which means access may be had to the bottom lining to repair it when necessary, or to remove clinkers or ashes. The quantity of air passing to the tuyeres is regulated by a valve, there being a blast-pipe or passage formed in the bridge, supplied with air from the blast-pipe, the air issuing by a number of perforations in the top of the bridge. The blast at the bridge is regulated by a valve, a pressure of blast of three or four inches of water being sufficient.

In noticing the new works, it may not be out of place to refer to the great increase which has arisen during the last few years in the demand for iron and steel wire. Formerly the trade was in a great measure confined to the finer qualities for needle-making, hooks, and iron wire for bonnets and mechanical purposes, the quantity consumed being truly infinitesimal as compared with late years, and the business in the hands of a few houses. At present, however, there are uses to which wire has been adapted that were scarcely dreamt of little more than twenty years ago, but which now tax the efforts of numbers of firms to supply, and afford an ample field for the genius of inventors in providing machinery and appliances calculated to increase production. The introduction of the telegraph system, land and submarine, wire-ropes, and rigging, and various other articles now made of iron and steel, which were not formerly made of those materials, have led to such a demand for wire that it has become an important branch of our national industry. The vast network of wires which now encircles the globe, and brings the most distant countries within an hour or two of each other, are but an instalment of what time will develope, so that the production of telegraph wire has yet to see its prime. Most countries of importance will desire to have a system of their own, and "put a girdle round the earth," or a large portion of it at least, so as to have it at their own command.

With reference to the new works, however, we may say that they are admirably laid out, and replete with all the necessary machinery of the most improved description for doing a very large business, and also for economising labor as far as possible. The furnaces are well arranged in connection with the mills, and there is a very fine stack at no great distance from them, and from which scarcely any smoke was emitted. There are four mills, comprising an 8, 12, 14, and 18-inch train, and all of the best construction. The 8-inch train which was at work in making No. 5 gauge wire, is a very fine one, and it was said, could not be excelled in the country. It certainly worked remarkably well, and on a piece of steel some 4 or 5 feet in length, and weighing about 1 cwt., being put into it from the furnace, it was rolled out into a length of something like a quarter of a mile, and coiled up ready for transportation in about a couple of minutes. The mill was worked by a coupled engine of 150-horse power, and which will also, we understand, drive another one. Another of the mills, which was engaged in rolling out Bessemer steel in lengths of 40 or 50 feet, and from 3 to 4 inches in breadth, was worked by a pair of horizontal engines, 32-inch cylinders. The steam from the engine is condensed. There are four boilers, about 23 feet long and 7 feet in diameter, being those patented, and made by GALLOWAY, of Manchester. There are the usual cutting and other machines, and all the necessary essentials for the carrying on of an extensive business according to the best and most economical methods. The new works, although separate and distinct, join to the well-known establishment of Messrs. GRAY & Co., where other steel is very largely produced.—*London Mining Journal.*

On the Examination of the Bessemer Flame with Colored Glasses and with the Spectroscope.

By J. M. SILLIMAN, M.E., Adj. Prof. of Metallury, Lafayette College, Easton, Pennsylvania. Read at the Troy Meeting of the American Association for the Advancement of Science.

[Continuation.]

I HAVE recorded the results of twenty-five observations on the BESSEMER flame, most of which were taken at a distance of about thirty feet from the flame, though I have stationed myself at intermediate points between that and the flame; at one time sitting so close as to be almost scorched. Nearly all my observations were made at night, and the lines obtained much better defined than when seen in diffused sunlight.

The record of my observations was kept as follows: Five columns were ruled, headed:

| Degree. | Color. | Brightness. | Time. | Remarks. |

Note was made of the dark bands as well as the bright ones, both of which were classed according to their distinctness, as very bright, bright, faint, and very faint. In the time-column was noted the number of minutes after the commencement of the blow at which the lines appear.

At the first two or three observations I attempted to make a thorough note of the changes as they occurred throughout the whole spectrum, but afterwards abandoned it as utterly impossible, as at the beginning of the second period, the lines come in so fast and the changes are so rapid that they cannot be accurately noted at the exact moment of their occurrence. I therefore confined myself to a few degrees at each observation, and by this method was enabled to note accurately, and at the exact moment of their occurrence slight changes which otherwise might have escaped notice. Note was also taken of the changes in the general appearance of the whole spectrum during the successive stages of the process. After having made half a dozen observations, while viewing the spectrum of the flame from the converter while it was being heated for another charge, it was discovered that a movement of the eye before the eye-glass occasioned a similar movement of the lines of the spectrum along the scale, on which their position could thus be made to differ more than half a degree. I have seen no notice of this in the statement of others, and it may account for some of the apparent discrepancies. Thereafter, when taking the readings of any of the lines, the position of the eye was so adjusted as to bring the sodium line exactly at 50°. Owing to the extreme brilliancy of the flame, the aperture may be made exceedingly narrow, and thus the many lines of the spectrum which with a duller light and broader gauge would be blended together, may be separated.

At the beginning of the blow, the spectrum is continuous and very faint, and generally extends from 35° to 120°, covering about three-fourths of the length attained in the second period. This increases slightly in extent and brightness until the appearance of the sodium line. This line appears at the end of the first period at the beginning of a more decided flame. It comes flashing through from one extremity to the other for an instant, and then disappears only to return the next instant in brighter flashes, which are continued for about a minute, by which time the line becomes permanently established. On one occasion the sodium line, instead of flashing and disappearing as usual, continued visible after a few seconds, and expanded and contracted in width almost isochronously until it became permanently established. The appearance of this line indicates the termination of the first period. This period I have found to vary in extent from three to seventeen minutes in blows lasting from thirteen to twenty-seven minutes. None of the other lines make their appearance in vivid flashes, as does the sodium. The lithium line becomes visible three or four minutes after the first flash of the sodium. It is very faint at first, but soon becomes quite distinct and lasts through the blow. The vivid flashing of the sodium line may be accounted for by the exceedingly small amount of sodium required to produce its spectrum—an amount not exceeding 1-180000000 of a grain. The slightest momentary combustion taking place in the stream of gas from the converter, would at that instant render glowing a sufficient amount of the vaporized sodium to produce its spectrum, and thus occasion the flashes so characteristic in the first appearance of that line. Lithium exists in a much smaller quantity, and requires 1-6000000 of a grain, or thirty times that given for sodium. By the time the lithium line is established, the red potassium line at 23½°, and occasionally the violet line at 135°, appear, and the blue and green fields become divided into bands which are so rapidly resolved into bright and dark lines that it is difficult to note the exact time of the appearance of each. The spectrum increases to a dazzling brightness, and extends itself in both directions until it reaches from 23½° to 140°.

During the third period the spectrum becomes more brilliant, and the lines more distinct. Several new lines make their appearance in different parts of the spectrum, of which the ones at 51½°, 57°, and 67° are well defined, while others are faint and not always visible, some of them appearing only towards the close of the last period. In viewing the lines in the most refracted part of the spectrum, it has been repeatedly observed, both by myself and others, that these lines were more strongly marked when entering the eye at an angle than when viewed directly. That this was not imagination, is proved by repeated identification of lines at the same point on the scale.

At the termination of the blow the lines are rapidly swept away, sometimes in the inverse order of their appearance, but more generally they disappear within the space of two or three seconds, leaving a continuous spectrum as at first, though somewhat brighter. Sometimes the sodium and lithium lines are swept away with the others, and at other times they remain visible. In either case the change is very decided, and does not generally occupy more than three seconds. In the course of my observations, thirty-three lines have been detected, as given in the table below.

Some of the lines given by LIELEGG I have failed to find, but have detected others not given by him.

1st Period, 23½, 35, 50, 135.
2d Period, 23½, 35, 43, 44, 44½, 45½, 46, 47½, 48½, 50, 52, 53, 56, 56½, 61½, 62, 62½, 63, 65, 66½, 67½, 70, 72, 120. 135.
3d Period, 23½, 35, 43, 44, 44½, 45½, 46, 47½, 48½, 50, 51½, 52, 53, 56, 56½, 57, 61½, 62, 62½, 63, 65, 66½, 67, 67½, 70, 72, 100, 102, 103, 105, 108, 135.

Among the dark bands detected, the most intense occurred at 44–46, 51–55, 56–58, 62–64½; others were found at 33–34½, 36½, 37½, 38½, 40, 68–72.

Many of the dark bands were crossed by bright lines.

I have repeatedly observed the dark band considered by ROSCOE to be a hydrogen absorption line, but have not noticed that its intensity varied with the dampness of the weather. Whether it is an absorption band or not can be determined by a series of observations continued through wet and dry weather. If this proves to be a hydrogen line, the BESSEMER spectrum will be found more complicated than is generally supposed. It has been thought by some that the dark bands in the spectrum are absorption lines due to the cooling of the outer sheath of flame, but it is more probable, that although the pellets of iron and slag tend to produce a faint continuous spectrum; yet in contrast with the very brilliant lines it appears discontinuous, the dark bands being merely intervals between the bright ones. The iron spectrum has not been satisfactorily identified. It has been suggested that the brightness and size of the lines of the BESSEMER spectrum do not allow the iron lines to appear. In comparing the BESSEMER spectrum with BUNSEN'S spectra of nickel, cobalt and calcium, no coincidences were observed except two or three in the latter spectrum. The brightest calcium line, however, was not visible in the BESSEMER spectrum. The BESSEMER spectrum contains yet many mysteries to be solved, among which is the cause of the non-appearance of the lines of the spectrum at the beginning and termination of the blow.

This was readily solved when the numerous lines of the spectrum were attributed to carbon, but in proving them to be caused principally by manganese, their disappearance is not so readily accounted for.

One theory to account for it is, that the luminous power of the flame is too small at the beginning and end of the process to produce a spectrum. In regard to this it may readily be shown that the brilliancy of the spectra of incandescent metallic vapors does not depend upon the illuminating power of a flame, but upon the heat of the flame into which they are introduced. For instance, the spectra are more distinct in the non-luminous flame of a Bunsen lamp than in the ordinary luminous gas-flame. If we take the theory as referring to the feebleness of light given off by those substances in the flame which produce the spectrum, it will resolve itself into one of change of temperature, notwithstanding the fact that the illuminating power of flames of the same temperature varies with the composition of the gas, because there is evidently enough sodium in the flame to give its characteristic line; hence, whatever might be the illuminating power of the flame, if the heat is sufficiently intense the sodium line *will* show itself.

Dr. WEDDING adopts the theory that the absence of the spectrum at the beginning and termination of the blow, is because the absolute quantity of the bodies volatilized producing the spectrum is at these times too small. His reasons for holding this view are as follows: "A trace of sodium will give its characteristic line, but, according to SIMMLER, a much larger quantity of manganese is needed to obtain a recognizable reaction than that which can be detected by the well-known blow-pipe reaction with carbonate of soda. Consequently, spectrum analysis does not depend alone upon the *presence* of a body, but also upon the presence of a certain quantity. And although manganese is always left in the iron, it may not be left in sufficient quantity at the termination of the blow to produce the spectrum, and for this reason the lines disappear."

To this theory there are some strong objections. Ist. If we take manganese in sufficient quantity and hold it in a flame, the spectrum will increase in brightness until a uniform temperature is attained; but when the amount of manganese vaporized begins to diminish, its spectrum will gradually decrease in brightness until it disappears. Now, if the disappearance of the manganese lines in the BESSEMER spectrum is owing to the diminution of the quantity of manganese, we should infer that these lines would gradually grow more indistinct, and then fade away; but, on the contrary, the manganese spectrum increases in brilliancy from its first appearance, and is more intense just before being swept away than at any other time. The analysis of the smoke, which appears when the flame ceases, proves that a considerable quantity is still volatilized, and it is notable that in manganiferous iron this quantity increases towards the close of the blow. 2d. It would be more difficult to account by this theory for the non-appearance of the sodium line at the beginning of the blow, as sodium then, in all probability, exists in the issuing gas in sufficient quantity to produce its spectrum at a high temperature, as it is only by special precaution that we can keep it out from any flame. 3d. A still greater difficulty would arise in applying this theory to the spectra of sodium and lithium at the close of the blow. As has before been stated, these lines sometimes disappear at the moment of complete decarbonization and sometimes remain. In the former case, to say that our friend sodium had given out, would be doing great injustice to that element, as it has never given us reason for bringing so grave a charge against it. Dr. WEDDING, in attempting to demonstrate that the non-appearance of the manganese lines is owing to the lack of sufficient quantity volatilized to produce its spectrum, makes the following statements:

From analyses made by BRUNNER, we find that the manganese contained in the iron falls from 3·460 per cent. in the raw material, to 1·645, 0·429, and finally to 0·113 per cent. in th decarbonized product; and that the protoxyd of manganese in the slag first increases from 37·00 per cent. to 37·90 per cent., and then sinks to 32·23 per cent.; and furthermore, that a certain quantity of manganese is to be found in the smoke. How much manganese is really lost by volatilization cannot be determined, since data are wanting as to the absolute quantity of slag and iron, consequently we cannot determine how much manganese has been lost by means of the eruptions.

But since the manganese contained in the pig-iron decreases constantly, and that contained in the slag, after the termination of the boiling period, also decreases, a considerable volatilization of this body is probable just at the time when the spectrum is best developed. Comparing with this the experiments that can be made in the laboratory, we arrive at the hypothesis, that the oxydized manganese which has entered into the slag is not volatilized, but is retained by the slag; it can, therefore, get into the flame only in the shape of solid or fluid combinations.

In the above statements, the results of the analysis prove that some of the manganese in the slag is volatilized. We cannot consider the manganese spectrum during the entire process as due wholly to the volatilization of the manganese directly from the iron, for while the amount eliminated from the iron grows continually less, the manganese spectrum grows brighter. Owing to the intimate mixture by the blast of the iron and slag, the manganese oxyd contained in the latter is brought in contact with the melted iron and vaporized. This mixing of the slag and iron would cease at the termination of the process, and this would account for the sudden diminution of smoke.

If there was a sufficient carbonic oxyd flame to render the escaping gases glowing, it is evident they would not issue from the converter as dark smoke, but as incandescent vapor having its characteristic spectrum. The lack of sufficient flame may, therefore, account for the disappearance of the manganese spectrum. The Bessemer flame presents other problems, and opens an intensely interesting field for scientific investigation; and by the use of more delicate instruments than have yet been employed for this purpose, discoveries may be made which will throw new light upon the subject of spectrum analysis.

Polytechnic Club of the American Institute.

Meeting held at the rooms of the Association, Dec. 8, 1870. Prof. S. D. TILLMAN in the chair.

TIN-WARE.

MR. T. D. STETSON described the improvements which have been made in the mode of manufacturing tin-ware, by striking up the metal into the desired shape, instead of forming it of separate pieces soldered together. By this improvement a tin pan, for instance, is formed of one piece of tin, without seam, instead of two or three, difficult to keep perfectly clean and liable to leak. HEATH, SMITH & Co. now produce pans of a single piece, with the sides absolutely perpendicular—the same kind of a job as in making percussion caps. It is easy enough to make dies and to bring force upon them; one of the main troubles is, that in bringing the die down the metal crinkles or buckles up. This is avoided by cutting out the tin of the proper form, but sufficiently large to afford a rim, upon which a ring of metal presses with sufficient force to prevent the buckling, but not sufficient to injure the tin. The problem is to hold on to this rim enough, and yet to allow the tin to slide and yield to the die. The method adopted is to bring hydraulic pressure to bear upon the ring, and independent hydraulic pressure to force down the die, the two being regulated at pleasure. The result is that the tin is not stretched materially in the process, but the part near the rim is made, as in upsetting, thicker than it was before. The angle is curved to a radius of about an eighth of an inch, to keep it from cracking. The outer edge is trimmed off and a stiffening wire put in in the ordinary way. Grimshaw's patent substitutes for the single die a series of dies, bringing the metal more gradually into the desired shape. A somewhat similar process is used in making dish-shaped vessels of boiler iron half an inch thick. In that case the metal is heated, and the press is so constructed that it can be brought down rapidly into contact, and then a powerful pressure applied.

Mr. FISHER stated that three or four years ago a vessel, about eight or nine inches in diameter and of the same depth, was made of Bessemer steel, by pressure, cold, without any flaw.

Mr. STETSON suggested that that might have been made by "spinning," or applying the pressure while the plate or the die revolved; for, after the expense of making dies for one had been incurred, they would have made more than one.

RAISING VESSELS OVER SAND BARS.

Colonel GOWAN read a long paper upon this subject, the commencement of which will be found in another column. The following discussion on this paper ensued:

Professor WHITNEY considered the paper read by Colonel GOWAN the most valuable to which this society had ever listened. It had shown the triumph of American engineering on the shores of the Black Sea, and it showed how the obstructions to navigation could be partially and perhaps wholly obviated. It pointed out great changes in the future, and opened a way for the breadstuffs of the western prairies to reach Europe without obstruction, the result of which would be to cheapen bread in every part of Europe, and the artisan in the remotest regions of civilization would have reason to rejoice at the triumph of American engineering. He concluded by moving a vote of thanks to Colonel GOWAN for his lecture.

The motion was unanimously agreed to.

Mr. STETSON inquired how far the docks and caissons at Sebastopol were sunk at the time of storms.

Colonel GOWAN—They were sunk to the water's edge. This relieved them from the force of the wind.

Mr. STETSON—Are there heavy waves there?

Colonel GOWAN—The heaviest I have seen, and I have been

in all parts of the world. These vessels were in the roadstead, outside of the harbor.

Mr. STETSON—I remember hearing, some years ago, about a scheme at Nantucket for lifting vessels over the bars. I have not heard of it lately.

Colonel GOWAN—That was constantly used until the shipping interest fell off there. It was used as long as they had whaleships. They had camels, which were put under the water and then pumped out. They have taken vessels over the bar at Nantucket in this way, I think, for thirty or forty years. The same thing has been done, to some extent, in Holland and in France, quite a number of years ago.

The PRESIDENT—The only patent taken out by President LINCOLN was for getting flatboats over bars in the river.

Professor WHITNEY—That invention consisted of a flatboat having overhanging guards, beneath which were expansible chambers, opening like an accordeon. In going over a bar these were opened, and when the boat passed over they closed up under the guards. It was a very ingenious invention, but how useful I am not prepared to say.

Mr. FISHER—As to the intimation in the lecture, that there is a limit to the filling up of a river, I remember that the river Po is about fifteen feet above the surface of the country. Bringing down silt from the mountains, it would have overflowed the country but for the embankments.

Colonel GOWAN—That would involve the necessity of levees on the sides of rivers, because there is no dredging carried on except at the bars.

Mr. FISHER—Our Coast Survey has shown that at Sandy Hook, and at the bars at the entrance of New York harbor, the depth of water is diminishing. Those bars have been steadily increasing ever since the surveys began.

Colonel GOWAN—During our late war no dredging took place in the Mississippi, but the bars did not materially increase.

Mr. FISHER—I suppose that for so short a time the increase is not sensible, but it goes on steadily.

Colonel GOWAN—You must remember that millions of tons are carried down the Mississippi.

Mr. STETSON—There are four tons per second delivered at the mouth of the river.

Dr. J. V. C. SMITH—I wish to express my admiration of the lecture to which I have been listening. I am proud of it, because it is a practical illustration of what has been accomplished by an American. I wish to call attention to the opinions of eminent geologists with regard to the accumulation of bars, and their functions. Rivers are the arteries and veins of the world. It is the great function of rivers to level the mountains, and to transport the matter above water into the ocean. I have recently passed over the Sierra Nevada and Rocky mountains, and seen the beds of great rivers which have long since accomplished their work; but there was no water there. The river was gone. The bars at the mouths of rivers are placed there to prevent the water from running too rapidly away from the country. If it were possible to remove the obstructions from the Mississippi river, the water would run so rapidly that the country would lose the benefit of the evaporation; and not only would the grasses and hay crops suffer, but animals themselves would suffer for the want of water. At the mouth of every great river there is a bay. That is a permanent law. At the mouth of the Nile I passed over a canal forty miles in length to get above the bar. Since the time of HERODOTUS, 2300 years ago, the bed of the Nile has risen seventeen feet. It is stated by Sir CHARLES LYELL, that the delta at the mouth of the Mississippi river extends 300 miles out into the Gulf of Mexico, and a thousand or two thousand years hence that great extent of country will be habitable, as the land in the neighborhood of New Orleans is now inhabited. But if that natural barrier was swept away, the water would rush down to the ocean and drain the country, and it will become uninhabitable. Therefore we must have bars; they belong to the constitution of the globe. Instead of spending money in removing them, it is far better to avail ourselves of the simple process stated this evening, to raise our vessels over them. Wherever this apparatus is constructed it will enrich the country, whether at New Orleans, Boston, or New York. Wherever facility is increased for commerce we shall have greater activity of commerce, and human industry will be encouraged. We shall open the way to the sale of our breadstuffs all over the wide world if we sustain the proposition that is made to us in the lecture of this evening. Adjourned.

Ship Raising.

A paper read by Col. GOWAN before the Polytechnic Club of the American Institute.

MR. CHAIRMAN AND GENTLEMEN: It is with no small amount of diffidence that I appear before you to-night to read a paper upon my experience in raising sunken vessels, in order to show you that the same principle I then worked upon may be applied to the safe and speedy conveyance of vessels of the largest tonnage over bars at the mouths of rivers; but I feel you will accord me your indulgence and sympathy when I tell you that it is only the fourth time I have lectured upon any subject, and the first upon this, and you will readily agree with me upon the wide difference between my present position and the one I have occupied in the conduct of those submarine operations to which the greater portion of my life has been devoted.

From time immemorial the process of raising vessels in a tideway, by means of the rise and fall of the tide, has been considered the only certain method of effecting that end, and my system is purely a practical application of the principle therein involved, with the single exception, but not an unimportant one in the economy of time, that I am altogether independent of the tide. A few of the methods hitherto tried are as follows:

In Holland a machine was used for raising ships by the buoyant power of water, called a camel. It is a very ingenious contrivance, and consists of twin hollow vessels, so arranged that they can be applied on either side of a ship's hull. They are made water-tight, and on the deck of each windlasses are attached, by which ropes passed under the keel of the vessel are worked. Each half of the camel is allowed to fill with water, which sinks with the weight, and when the ropes are adjusted the water is pumped out, and the buoyancy of the hollow vessels lifts the ship out of its bed at the bottom of the stream.

The largest man-of-war in the Dutch service, CRESSY says, could be floated over the sandbanks of the Zuyder Lee by means of this machine. It was invented by BAKKER, at Amsterdam, about the year 1688, and has been used at Venice, on the Tiber, and elsewhere, with success.

BONVAUX and GOUBERT, eminent French engineers, also contrived to raise vessels which had been sunk twenty-four and forty-two years respectively, by means of elaborate processes, which it is now needless to describe. Nor is it my intention here to enter very fully into the various schemes which have been brought forward—some partially successful, some totally impracticable, and others never yet tested. Suffice it to say, that for a number of years the question has been one of profoundest thought to me, and I believe there are but few, if any, of the tested or suggested methods which have not come under my inspection, while many of them I have myself employed with varied results.

About the year 1849 an invention was submitted to the United States Government, having for its object the raising of vessels by means of air-tight cases, composed of several thicknesses of canvas and India-rubber, with a strong netting on the outside. Upon a trial which took place, with a view of ascertaining the value of this invention as a means of bearing a vessel over a river's bar, it is notable that a sloop-of-war in Baltimore, having a number of cases attached (if I recollect right, twenty on either side), was only raised some eighteen inches. Government, however, purchased the apparatus, and soon discovered that for the intended purpose (viz., the raising of submerged ships) the method was a total failure. I shall subsequently have occasion to refer to an instance in which I also met with the same results.

Other and very costly apparatus has been designed for raising vessels by powerful hydraulic pressure; but I am not aware that either of such modes has been practically tested, and those I have seen in models are open to serious objections for practical working, though in theory they are all that may be desired. But as I said before, it is not my intention, even if time permitted, to critically discuss the schemes of others, but rather lay before you some of my own experience and an explanatory statement of the method which, after a long course of disheartening failures and obstacles overcome, finally enabled me to achieve the most perfect success.

About the year 1845, the United States steam frigate "Missouri" was burned and sunk in the Bay of Gibraltar, causing an obstruction which was the subject of complaint by the British Government. Upon its representation, the United States Government undertook to remove her, and in various ineffectual attempts expended no less a sum than one hundred thousand dollars, the engineers employed reporting that it was impossible by human ingenuity to effect the desired end. In 1851, upon a second application from the British Government, it was resolved to make a further attempt, and I was honored with a commission to carry out the project. I found the vessel (a first-class war steamer) sunk in about six fathoms, and laid over broad on the bilge, having about three fathoms clear over all, and completely covered with sand. Government had forwarded twenty of the before-named air bags for me to test, which I accordingly did, and succeeded most effectually in bursting up the greater portion of them without getting an aggregate lifting capacity of nine tons, and this happened generally before they were half inflated, though each bag or case was supposed to be equal to more than five tons. I at length concluded that the only effectual means of removing this vessel was by exploding gunpowder beneath her keel, which I did by the following process:

I directed the construction of pointed cast-iron cylinders, some seven feet in length, fourteen inches in diameter, and one and a half inches in thickness, having three turns of a screw cast on the point (similar to a screw file) filled with gunpowder, and closed by caps secured with screw bolts.

These cylinders were placed outside the vessel in such a manner that on being driven through the sand some thirty feet they would arrive beneath the vessel's keel. To effect this I used a shaft of wrought-iron, constructed to fit over the head of the cylinder. This shaft worked on a raft on the surface of the water and was turned down in the same manner as the the screw pile now in use, so that by its means the cylinders were placed in the required position, and the shaft being removed, were exploded by electricity. The vessel was in this manner broken up, and raised piece-meal, and the obstruction entirely removed. In token that the operation was performed to its complete satisfaction, the British Government presented me with a certificate to that effect.

Shortly after this, in the year 1854, my attention was called to the steamship "Erie," burnt and sunk with great loss of life on the lake of that name. She lay in about ten fathoms, and several attempts had been made to raise her, one of which was by means of "Bishop's Floating Derricks." Report alleged that the vessel contained about $400,000 in specie, and thousands had been spent in fruitless endeavors to raise her to the surface. However, it seemed to me to be anything but a hopeless task, and with very little difficulty. I managed to raise her entire by means of chain-falls working from two open trussed frames, the ends of which rested upon hulks on either side, and towed her into Buffalo Creek, hauled her ashore and cleared out her contents, and a mass of amalgamated metal supposed to be gold and silver, which appeared to be such a rich harvest that I refused an offer of $50,000 for one half share. Taking the metal to New York, it was submitted to assay, and I was informed that six days would be required to make the investigation.

On the morning appointed, however, when I attended with some friends to learn the extent of my good fortune, I found, to my surprise and chagrin, the result of the assayers six days' labor was the production of two small bars of silver, valued in all at about $750, and that my supposed gold was transmuted into the less precious, though very useful, metals which had composed the connections and fittings of the engine of the sunken vessel.

Did time permit, I would call your attention to various other experiences and experiments prior to my undertaking the operations in Sevastopol harbor, which laid open to me a system by which vessels of the largest size may be lifted from the depths of the sea and borne expeditiously and unharmed into their destined port. In the year 1856, I received a communication from the Russian Minister at Washington, to the effect that his government wished to negotiate with me for the raising of the sunken fleet at Sevastopol.

On his further invitation, I at once proceeded to Moscow, and through Prince GORTSCHAKOFF, had an audience with his Imperial Highness Duke CONSTANTINE, then Grand High Admiral of the Russian navy, who requested my judgment of the practicability of removing from Sevastopol harbor the numerous and formidable obstructions which the past policy of the Russian Government had created. Having already given the matter most serious reflection, and settled upon the only plan which to my mind bore a probability of success, I submitted to his Imperial Highness plans of docks or caissons of which I approved, and he at once desired that I would enter upon the work proposed.

Familiar acquaintance with the difficulties surrounding such a task increased the hesitation I felt in undertaking at all a labor of such magnitude and importance; but ultimately, at the urgency of the Government, I accepted the contracts on terms subsequently materially altered, which resulted, on account between us, in a balance of about $250,000 in my favor; and in the spring of 1857 I arrived at the scene of those labors and operations, which were to extend over the five following years.

I may here state that the Minister of Marine at St. Petersburg sent me about twenty of the camels, or balloon-bags, somewhat similar to those which had exploded under my hands in the Bay of Gibraltar, and with these I again experimented, but with no better fortune than on the former occasion, and I finally threw them aside as practically worthless.

Making no further comment upon the many theories propounded on the subject before me, but confining myself strictly to a statement of my system and its results, I will at once proceed to an explanation of the appliances I used, and their method of operation. In the first place, I had intended to make use of four floating docks (as I prefer to call them), on a smaller scale than those shown in the diagrams; and I may be better understood when I state that, on being tested, these four docks had an equal lifting capacity with two of those I am about to refer to.

They were designed to lift by chains through centre well-holes, upon which plan my first attempt was made. It was, of course, obvious to me that such a process must bring the docks together as the vessel rose from its bed, but I trusted in the use of heavy anchors to keep them apart, a power which proved to be utterly insignificant. Much to my amazement, as the vessels were lifted the docks came together so firmly that all the means I had at my command were insufficient to start them an inch apart, although I brought into requisition steam craft, gun-boats, etc., whose united action amounted in the aggregate to 1,000 horse-power.

Here was a grave difficulty, and, in addition thereto, doubts arose as to whether I could control enough lifting power to compass the end in view. I might raise a vessel until the broken masts and top hamper touched the caisson's bottom, but could hardly hope to bring her to the surface, and at this time I was working with the lighter vessels. To meet this trouble, therefore, I determined, while altering the docks in use to meet the demand, to construct two others having a lifting capacity equal to the four smaller ones, and for this purpose had to penetrate some hundreds of miles into the country to cut the requisite timber. Suspending all raising operations until the new docks were completed, I took the field with the six, and if you will kindly follow me, I will explain in some detail their construction, taking one of the larger ones for illustration.

[TO BE CONTINUED.]

Gun Making in Paris.

THE following account of the operations in the French capital is taken from our English contemporary, *The Engineer*:

PARIS, December 5.

The discussion relative to the fabrication of large guns with long range is maintained with great energy, and no wonder, when we know that the enemy is busy arranging twenty-six or more of Krupps siege artillery at the south and west of Paris, that is to say, on the slopes of Belleville or Sèvres, and, as supposed, on the plateau of Châtillon. The armistice may render all this labor vain, but there is no reason yet for suspending operations, or for not proceeding with the manufacture of big guns as rapidly as possible. Of course it will be a sad disappointment to find them too late, though better late than never may be said in the case of bombardment.

A civil engineer, whose opinions I have quoted in former notes, persists in denying the chances of success in producing great guns in Paris under present circumstances. He says that

having seen the operations performed at MM. PETIN, GAUDET & Co.'s, he does not believe that the Parisian shops possess the necessary machine tools for the welding, forging, etc., of puddled steel rings, nor will he admit that Paris possesses steel or iron certainly safe for the manufacture of such rings. He asks whether any one Paris foundry possesses furnaces enough to melt at one charge the 20 tons of iron necessary for a 24 centimetre gun.

The number of bronze guns, with carriages, harness, and accessories complete, now in course of delivery, and to be completed before the 14th instant, is 350! The field artillery in Paris previously consisted of 240 pieces, muzzle-loaders, namely, twenty batteries, six guns each, of 4c. rifled guns; fourteen batteries 12c., and six batteries of mitrailleuses. The Prussians, having found their pieces of 4 insufficient, have replaced them, as regards the foot artillery, by pieces of 6 of cast-steel, breech-loaders, and pieces of 12 in bronze, muzzle-loaders. In order to meet this change, the French authorities have increased the proportion of pieces of 12c., and have put in line some excellent pieces of 8c., which, for some reason or other, the late Government had left unemployed. General GUIOD has now replaced six of the 4c. batteries by pieces of 12c. and 8c. Three new batteries of pieces of 7c., breech-loaders, are now ready; these form part of the 300 already mentioned. This information is official. The pieces of 7c. are in bronze, and throw projectiles of 15 pounds weight; the shells have lead jackets to take into the grooves of the gun. The mode of closing the breech is that of M. TREUILLE DE BEAULIEU, somewhat modified. One arrangement worthy of notice is that the gun cannot be fired unless the tightening screw and lever are in their proper place. The pieces of 7c. are lined with brass; the bronze of which they are made is a mixture of 90 parts of copper and 10 of tin, the brass of about 62 parts of copper, 35 of zinc, and three parts of tin and lead. The brass is found to solder firmly to the bronze, and after the gun has been fired two or three times the tin is expelled from the brass, which becomes, it is said, transformed into a new alloy of extraordinary durability. The thickness of the brass lining is about half an inch. The brass is found to answer far better than steel lining, which has a tendency to disengage itself from the bronze. A considerable number of breech-loading guns are placed upon the ramparts; they are 24c., 12c., and 8c. calibre. The breech system is that known as the wedge, WAHRENDORFF and TREIULLE. Three of these guns were made by KRUPP, who, it is well known, formerly offered his services to the French Government, just as NAPOLEON I. is said to have offered his sword to that of England. At the commencement of the war M. DEJEAN was invited to bring his machines and tools for the fabrication of projectiles from Evreux to Paris, and for the last few weeks he has supplied 1200 shells a day. In 1840 the armament of Paris was fixed at 1824 pieces, with a reserve of 540, but the late Government had neglected this; now there are 2190 guns in battery, with a reserve of 350.

The Prussian position on the plateau of Orgemont is now completely checked by the large guns of the new bastion of St. Ouen; the marine artillerymen have formed excellent casemates, and the bastion is more like a ship than a land fortress. "This point, at any rate," said a visitor, the other day, "is well defended." "Defended!" was the reply; "it is *prohibited!*"

The firm of BROQUIN & LAINE delivered, on the 26th ult., to the Government, fifty bronze mortars, and is now producing four breech-loading cannon every third day.

Manufacturers of all trades are producing arms. MM. CHRISTOPHE & Co are making 50,000 sword-bayonets.

MM. SAUTER, DALIFOL, LEFAUCHEUX and LECOQ are all engaged on breech-loading cannon; MM. CAIL & Co., besides these, are engaged in transforming rails for gun barrels, with the aid of fourteen steam hammers. In the courtyard of one of the ministries stands a locomotive tower which attracts great attention. It is composed of strong iron plates, pierced with loopholes, and has a thick timber and plated roof. There is room for four men inside. Such a tower, with a good mitrailleuse inside—for which probably it is designed—would do great service just within the ramparts, as it could at once be brought to the point of action.

It is curious to note how our friends here are beginning publicly to recognize the extraordinary talent of WELLINGTON in forcing difficulties aside, and gradually converting what was deemed defeat into triumph. "The duty of the Governor of Paris," says a military journal to-day, "is traced by circumstances. * * * It is to remain in the capital, as WELLINGTON did within the lines of Torres-Vedras, against which MASSENA wore himself out by vain efforts in the winter of 1809-10." And it should be added that MASSENA was such a worthy antagonist that the Duke said of him, "I always found him just exactly at the spot where I least hoped to see him."

The enemy's batteries are being completed from Meudon to Châtillon, opposite the south-west side of the *enceinte* of Paris; they are constructed with great care, casemated above and below, the lower casemates being for the men; the upper have roofs five or six feet thick against the effect of shells; the embrasures are from twenty-four to thirty inches wide. Before the arrival of the German siege artillery, the idea was that it would consist of such enormous pieces as KRUPP showed at the Exhibition in the Champ de Mars, in 1867, and that the range would be so much superior to the guns here that all chance of successful defence would be at an end. This notion is now contradicted. In the first place the guns of the fort have done great damage to their forts, and continue to do so, and, moreover, it is declared that their armament is far from being so heavy as was supposed. KRUPP's heavy guns have not been brought to Paris; the siege artillery of the enemy is composed simply of pieces of 12c. and 24c., which have not so great a range as the ship guns in the forts, or such destructive effects. It is added that the Prussians do not employ many 24c. guns, finding that they do not stand, so that the batteries are most chiefly armed with 12c. pieces. The most effective range of these guns is given at 2,000 metres, and their extreme range at 6,500 metres, and at the latter distance their destructive effect is equal to that of the French ship guns at 7,500 metres. If this be true the enemy is not so strong, and we may add, not strong enough to bombard Paris or take the forts, every one of which, by the way, could probably be blown up if dismantled. Let us hope that the armistice now under consideration will put a stop to this barbarous conflict, and that we may never have reason to know that the estimate of the enemy's siege artillery is beneath the truth.

The Military Engineering Commission has had brought before it an ingenious plan of disabling the guns of an enemy which may be taken, but cannot, for want of horses or other reasons, be removed. An engineer has invented a small torpedo, which, placed in the mouth of a gun, causes a longitudinal fissure that completely prevents the gun ever being fired again. It has been tried with perfect success, and adopted.

A working engineer, named LAUDET, has invented a breech arrangement which attracts attention. It consists, in fact, of a cast-steel tap, with way big enough to allow of the passage of the charge. A steel cylinder moving on its own axis is fixed horizontally at the back of the breech, and pierced like an ordinary stop-cock; a powerful lever opens the way when brought to a vertical position, and closes it when pressed down in a line with the axis of the gun. The arrangement is pretty, but it is questionable whether it would prove easy to make such a breech perfectly gas-tight on a large scale.—[The idea is very old.—ED.]

The gas company, in order to economise fuel as much as possible, has commenced injecting petroleum into its retorts, and also to make use of gas tar in its furnaces. This was not commenced before it was needed, for the other day orders for coke for domestic use had to be booked two or three weeks in advance.

The Crusaders, it was said, brought civilization from the East. War certainly does something for science. The use of the electric light is common to both sides in the present struggle, but the French have used it largely. The apparatus set up on Montmartre is arranged by M. Bazin, and is electro-magnetic. The central cylinder supports four series of double coils covered with copper wire enveloped in silk; the cylinder is rotated by a small steam-engine of three-horse power, making 400 revolutions per minute. The lamp used is of the ordinary form, with the Foucault-Dubosc regulator. The reflector is parabolic in form, and the whole is surrounded by a shield to hide it from the enemy. This light, from its elevated position, commands the whole of Paris and the plains around. A spectator on Montmartre sees distinctly the details of the façade of a building which stands 2,000 metres off; at 2,900 metres a man may be seen standing at a window; at 3,000 metres a mass of cavalry or infantry is distinguishable, and at 4,000 metres the dome of the Invalides, with its bands of gold, is brilliant. A man cannot be seen on the dome at that distance, but on walking towards the building, all soon become clear. On the ramparts, at 3,800 metres from Montmartre, the light is sufficient to read an ordinary newspaper.

Thus, though the practical effect of the lamp only extends about 300 metres from its position, the field is illuminated to the extent of 700 metres, for the benefit of all placed between the light and the object. Thus a sentinel on the ramparts can see about 3,000 metres from the *enceinte*, and by this means strict watch is kept upon the plains around the city at night, as far, in one direction, as 1,000 metres beyond St. Denis. M. BAZIN is now occupied in applying his apparatus to the purposes of night telegraphs, by the adoption of the system of flashes—mentioned some time since in *The Engineer*—and with the aid of colored lenses. A corvette—the Coligny—already possesses such a signal apparatus, and the signals are distinctly visible at more than eight miles distance. The action of the lamp, and also the movements of the apparatus, are remarkably steady, and M. BAZIN has received high testimonials from the authorities of the good working of his instrument.

M. VIOLLET LE DUC, who is M. ALPHAND's second in command of the corps of civil engineers and architects aiding the military authorities, has made an interesting report to General TROCHU, respecting the works executed during the past month by the auxiliary engineers around Paris. It appears, according to this document, that the expense of these works has been only 105,000f., while, under the military system, they would have cost 230,000f. We have not seen the report, but we presume that M. VIOLLET LE DUC, and the other architects and engineers, gave their services and advice gratis, and this would, of course, save the country a considerable sum.

The Government has voted the sum of 40,000f. to enable M. DUPUY DE LOME to carry out his proposed plan of navigable balloons. The subject has been twice discussed in the Academy of Sciences, and although some members have advocated the use of a small steam-engine or other motive power, I think M. DUPUY DE LOME is wise in adhering to manual power, which presents all the force necessary, with none of the inconveniences of machinery, and an adaptability to circumstances which no machinery can possibly possess. The men will form a crew to aid the landing of the balloon, or in extricating it from any difficulty, while any engine would be, when not in use, a dead weight and awkward encumbrance. Moreover, an ærostat, with steam or other power, is now in construction by another inventor or adapter.

During the discussions, M. DUPUY DE LOME showed by calculations that his balloon would have a constant ascensional force up to 870 metres altitude, but that beyond that to 1,410 metres a little gas must be lost. At all events, between 250 metres and 870 meters, the altitude could oscillate (by means of the extra pocket or swimming-bladder) without loss of gas; and, of course, there would be the usual expedient of ballast to be depended on also. Dr. MONRA advocated the use of heated air in place of gas. 50° Centigrade would be sufficient, and the heat might be retained by making the balloon double—that is to say, one balloon within another. The Aigle Mongolfiere, said the Doctor, used to be inflated in twenty minutes, while it takes a whole day to fill a balloon (upwards of 1,000 cubic metres) with gas. Mongolfiere balloons, sent up within twenty leagues of Paris, would certainly fall in the city, and it is a pity they have not been tried before this. Should the siege not soon be raised, will not the English aeronauts or others try and send us a few letters?

All the railways except the Eastern have been ordered to get ready for business immediately. Good news. I trust it will turn out true. Schools are reopened, societies are reopening, theatres and concerts are beginning to draw large charity audiences; but the puff of a locomotive bound for Calais would certainly interest me very much more just at present.

MINING SUMMARY.

New Mexico.

COAL.

The Cimarron *News* says: "In addition to the other sources of wealth which give so much promise for the future of our Territory, coal in abundance has been found on the Maxwell Grant. In the Ratoon mountains, along the Red river and on the Yermejo there are large and distinct beds, some of which are ten feet thick or in depth. The coal is bituminous, and of the best quality to be found on the continent. Also on the Poñiel creek large veins crop out all along the mountainous course, whose quality excellent judges pronounce unsurpassable. Along the Cimarron river there are also well-defined evidences of large coal beds, but as yet the company have not had time to open them. Indeed, the entire grant is permeated with beds of coal, which crop out at different places. The blacksmith at Cimarron uses it for all his purposes, and says it answers as well as charcoal. A family residing near Cimarron use it fo cooking purposes, and they too say that its quality is excellent, and they prefer it to wood."

THE NEW SILVER MINES.

During the past year, silver mines of great extent and richness have been discovered and worked in the counties of Grant and Mesilla, in southwest New Mexico. Among these the Burro mines, largely owned by San Francisco capitalists, have attracted the most attention. These mines are situated very near the borders of Arizona. A new town, called Rolston, containing nearly 1,000 inhabitants, has been brought into existence through their instrumentality. The Sante Fé *Post* contains an interesting letter from Silver City, in the heart of the newly-discovered Cienega district, fifty miles northeast of Rolston. It reads as follows: "Many experienced miners say that the Cienega ore closely resembles that of the White Pine region; that here, as there, the deposits are limestone, and run in pockets, rather than well-defined ledges. At the same time, these parties concede that the district is much more extensive than that at White Pine, and the returns from the ore, even from the rudest assays, are more uniform. Many, however, go further than this, and unhesitatingly assert that they can trace well-defined fissure-veins, and that as soon as shafs are sunk to any considerable depth the correctness of their theory will be demonstrated. Whichever opinion may be correct, it is certain that here, in the immediate vicinity of Silver City, are immense deposits of silver ore, the richness of which is unquestionable, and the quantity of which, whether it lie in pockets or veins, is well nigh inexhaustible. The portion of the district in which the ore is most abundant extends over a space fully half a mile in width, and running northeast and southwest for a distance of three miles. The work, so far, has been little more than prospecting. Shafts, some ten or twelve feet in depth, have been sunk, and the requirements of the law generally complied with, but no extensive operations have yet been undertaken. The ore taken out at these shafts assays from $1,000 to $2,200 to the ton, and some specimens have even gone as high as $3,500. The greater part of this ore partakes of the nature of chloride, or what is called 'horn silver.' Rich as it is, it sinks into insignificance beside a discovery which was made six months since in what is known as the Chloride district. This is about two miles distant from Silver City. We saw a specimen of the ore at Las Cruses, which was pronounced by experienced assayers to contain fully ninety per cent. of pure silver. A miner, at Silver City, took enough silver to make two large sleeve buttons from a piece of ore no bigger than a hen's egg. It is claimed that this chloride will average eighty per cent. of pure silver, and the fortunate owners of these mines have immense wealth already within their grasp. Some few days since, a capitalist who was visiting Silver City, and who wished to fully satisfy himself as to the richness of the ore which had been taken from the different shafts, had one hundred pounds of it reduced under supervision. The work was done by the old Mexican process, and of course a considerable portion of the silver was lost, but notwithstanding this, the ore yielded a plate of silver, for which forty-five dollars were paid upon the spot. This plate is now upon exhibition at Las Cruces. The capitalist was so well pleased with the result of the experiment, that he immediately made arrangements for securing a mill site upon the stream close to town. He than contracted with the various miners in the vicinity for one thousand tons of ore, engaging to reduce the same at forty dollars per ton. This gentleman is now on his way to the States, and proposes to have a mill in full operation at Silver City by next spring. The stream passing through the district will run two, and perhaps three mills. There is every prospect that a second mill will be erected. One of the heaviest capitalists in the country has his agent already on the ground, and it is said that he intends to put a forty-stamp mill in operation at the earliest practicable moment. Ten miles north of Silver City are the celebrated gold mines of Pinos Altos. These mines were discovered and worked before the war, and are said to have already yielded several hundred thousand dollars' worth of the precious metal. But little work is being done here, except in the way of placer mining. The gold quartz is found in a range of hills nearly one thousand feet above the level of Silver City. The richest ore is found in the very tops of these hills, and it gradually decreases in value as we descend. As the gold disappears silver is developed, and still deeper, copper and iron pyrites are found in immense quantities. These latter have been found so difficult to work that they have never been penetrated, and the mining has been confined to surface operations. The leads which can be distinctly traced number thirty or forty, only a portion of which have been worked. There are two mills at these

mines, but they are not worked with regularity. A week or two ago, a party of miners hired one of these mills for six days, and in that time took out eleven hundred and sixty dollars' worth of gold."

Colorado.

NEVADA ITEMS.

The Central City *Herald*, Dec. 3, has the following: "WATERMAN is running twenty stamps at the Kansas-Colorado mill, which are supplied with water from the Flack lode, by means of pump-logs. He is working the Flack mine quite extensively and successfully. Twelve stamps of the Kansas-Colorado mill, and the Eureka (twenty stamp) mill, are both employed in extracting Flack ore, which pays well. Mr. WATERMAN is also working claims on the Kansas, Camp Grove, and Gardner lodes. W. R. KENNEDY is working the Hawley-Gardner property, in conjunction with some English capitalists. The shaft is 240 feet, where a fine body of ore is visible. Seven men are employed in the mine, and a considerable amount of quartz is being raised. We understand a sale of this property is being effected in England. STALKER is again taking out ore from his California claim. He stopped work last week to repair boiler, etc. COLLINS & Co. are taking out large quantities of ore from their claim on the same lead. Mr. WHITCOMB is overhauling and improving his mill. Two new batteries have been put into the new addition, and the old ones will also be replaced with new ones. The new boiler is also up and ready for business when other improvements are completed. Mr. WHITCOMB has built a large reservoir adjoining his mill. It is forty feet square and twelve feet deep, and will supply his mill with all the water required. Three claims are being worked on the Jones lead—those of CAPT. PHILLIPS, ANDREWS, and MCGONIGAL are all paying well. MESSRS. WOODWARD & BOSTWICK, YOUNG, LAYDEN & Co. are working claims on the Sudeberg. On the Alps, the French and Pyrennees l des are yielding good pay. ESTERBROOK and the LEONARD BROTHERS are working claims on the former lode. Mr. KLINE is taking out ten-ounce ore from the Fairfield lode in Russell gulch. BRADLEY & CREE have their new steam engine at work on the Kent county. Several other parties are also working claims on this lode. SABIN is drifting in the Forks lode. The Kansas lode is being extensively worked, and is generally yielding good pay. SHANSTROM & Co. have let a contract for sinking fifty feet on their claim. A. S. BENNETT is taking out large quantites of nine-ounce quartz on the same lead. BRIGGS & Co. are sinking on the adjoining claim, and a short time will bring them down to pay equally good as BENNETT'S. QUARL, ALDRICH & Co. have purchased the Philadelphia G. M. Co.'s property on the Gardner for $20,000. They have been working this claim during the past year, and the yield of rich-paying ore has been large. Their ore keeps thirty-two stamps running steadily. STALKER has sixty or seventy tons of ore in the stopes and drifts of his mine, which he is taking out rapidly. BRASTOW'S mill, in Russell, is running steadily on ore from QUARL & ALDRICH'S mine on the Gardner.

IDAHO ITEMS.

The *Herald* has also the following: "Several buildings are going up in Idaho; among them a large ale-brewery is being built by H. BARNES; a bowling-alley, by HARDER & VANCE, and a beer-brewery, all located near the bridge. It is rumored that a compromise is being effected between different owners on the Seaton lode, whereby the whole property will come under the control of the English company now working a portion of it, under the management of Genera, WIGFAL and Mr. TIELE. This mine continues to produce largely, especially the claims worked by SEATON, which, for some months has shown an extraordinary yield. Some very fine ore has been struck in the Shaffter lode in Hukill gulch, in the shaft at a depth of sixty feet below the surface. Messrs. DAVIS & RAE are building a large dam at the Myers stone mill, where the Rae process is in operation. The old roasting furnaces are being removed from the mill to give place to new machinery. The ore in the Whale mine is steadily improving. A new pulverizer and Bruckner cylinder are being put into the Whale mill. One of the difficulties of the past season has been the small capacity of the pulverizer used. The new one is much larger, and will crush from ten to twelve tons in twenty-four hours. Prospecting is going on in Chicago creek. The mines are producing well, and new discoveries have been made within the past week."

THE MINES AND MILLS OF GILPIN COUNTY.

At present, says the *Herald*, Dec. 3, some twenty-seven mills, with over 500 stamps, are in operation in Gilpin County. There are also the smelting establishments of Prof. HILL, and of CONDON & WEST, that have all they can do. Of the stamp mills in Black Hawk, the following are working steadily—The Sensenderfer, FULLERTON & KIMBER, MEADE'S three mills, LAKE'S, the North Star, MILLER & BORUM'S, FITZPATRICK'S, LEWIS'S, the Black Hawk Company's Consolidated Gregory, New York, ———, and DICKINSON'S. These sixteen mills have an aggregate of about 314 stamps in motion. At Central, the Lexington, and the BARRETT mills are running forty-two stamps. In Nevada and Eureka gulch, seven mills and 116 stamps are at work. These are WATERMAN'S Eureka and the Kansas-Colorado mills, POTTER & HOLLEY'S, BEVERLY'S, CLAYTON'S, the Hardesty, and the Philadelphia mills. KIMBER, at Black Hawk, has bought out CONANT'S interest in the Fullerton mill, and FULLERTON & KIMBER are running fifteen of its stamps on Sudeberg ore. ROGERS is running the twenty-stamp Sensenderfer mill on ore from the Sensenderfer claim on the Bob Tail lode. Mr. LAKE keeps his mill (the Bob Tail) running steadily on Sudeberg and Burroughs ore. This mill is kept in fine running order, and in excellent condition, and is considered among the best. Its twenty stamps crush, on an average, about two cords per day. MEADE is running three mills on North Clear Creek. Of these his new mill is crushing Stalker ore from the California. This is admirably arranged and runs without intermission. The Holdbrook has been crushing Prize ore for SCUDDER. Two new batteries have lately been put into this mill by Mr. MEAD. The University mill is running fifteen stamps on Prize ore from BUCK & Co. The North Star mill—KIMBER, BUFFINGTON & Co.—has twenty-five stamps in motion on custom ore from Black Hawk, Nevada, and Russell. From twelve to fifteen cords per week are crushed at this mill. Eight new stamps—two batteries—are being put into the new portion of the mill, which will increase the number of stamps there to twenty, and in the whole mill to thirty-three. MILLER & BORUM are crushing quartz from the Gregory Second at the mill at the foot of Chase gulch. Mr. LEWIS is running the twelve-stamp mill lately worked by the STEVENS BROTHERS, on Burroughs and Gardner quartz, and FITZPATRICK'S mill, as usual, are always in motion. The Black Hawk Company keep sixty stamps going, and the Consolidated Gregory twenty-five. Forty stamps of the New York mill are running under lease from the Central Company, on Roderick Dhu quartz. The remaining fifteen are crushing custom quartz from various quarters. ROOT & QUEEN are still energetically working their gulch claim at the Toll Gate, Black Hawk. They are now sinking a new shaft. ROLLINS & WALKER are still gulching on their claim just below HILL'S works. HILL'S works, as usual, are in full operation. The yard is well filled with ores, and the whole establishment wears its customary air of prosperity. There are large quantities of ores lying ready for treatment from the mines of Gilpin, Boulder, and Clear Creek counties, of which those from the Cariboo and Seaton are the most noted. In our rounds among the stamp mills we called at Judge DICKISON'S, below Prof. HILL'S works, where we found Mr. CHAS. H. MARTIN running the stamps: also two large and three small iron pans upon sulphurets and blanket concentrations. The pans are run after the method practised and taught by Mr. JAMES HITCHINS. Mr. MARTIN is obtaining extraordinary results from his pan treatment, and speaks highly of the process. He is regarded by his friends as being one of the best mill-men in the Territory. Mr. MARTIN and Judge DICKISON are making arrangements to increase the pan capacity of the mill at an early day. We are glad to learn that we are at last to have among us men and processes that can successfully and economically master our low-grade ores and sulphurets.

Nevada.

HUMBOLDT, OREANA.

A correspondent of the *Si ver State*, Nov. 26th, writes: The large smelting works are closed pro tem. I hear that George Lovelock will re-open them. TORRY & SON have commenced smelting at their works on the river, and are getting out ore from their mine. The Miller mine, Relief District, will pay back to the New York company all the money it has expended on its other mines. The company is erecting workshops, etc., and is about to erect a mill.

CRYSTAL.

This is a promising mine, owned by JAMES C. WOOD and J. F. COLE. It is on the eastern slope of the main mountain. The ore assays from $182 to $431 the ton. The claim was located last August, and an incline, following the dip, has been sunk twenty feet, exposing a fine body of ore.

CONTRACT.

The Potosi Company has let a contract for sinking on the Potosi ground, one mile south of the Inskip, and the prospect, so far, is flattering. The vein tapped is said to be nearly five feet wide, and the ore of good quality.

INSKIP AND NORTH STAR.

As work progresses these mines continue to improve, both in quantity and quality of ore at present, a quantity of fine shipping ore is being taken out.

REESE RIVER.

An Austin telegram of 23d says: The Manhattan mill has just completed a run of ninety-three tons of ore from the El Dorado South mine, of Belmont, belonging to LEON & Co., which keeps up with the previous yield. The ninety tons gave an average assay value of $240 per ton, and three tons yielded at the rate of $303 per ton. The ore was obtained from the water level, at which point the lode is nine feet thick. The lot worked was selected from this vein in the proportion of one-third, the other two-thirds, averaging between $60 and $75 per ton, not being sufficiently rich to justify hauling. Upward of 1,200 tons of this class of ore are now on the dump at the mine, and the quantity is constantly increasing. Fifty tons of first-class ore are now on the way here for reduction.

DEEP SPRING VALLEY.

The Franktown correspondent of the *Inyo Independent* assayed ore samples from twenty-three locations, and found the lowest $29, and the highest $1,091 per ton. A sample of La Cruz ore assays $7,491 in silver.

MOUNTAIN CITY.

The Elko *Chronicle*, Nov. 27th, says: "All three of the mills are now in operation—the Vance crushing rock from the Blue Jacket, with small supplies from Bull Run and Bruno to test. NORTON'S mill is crushing rock from the Belle of the West, but will soon commence crushing 200 tons from the Excelsior lode of the Agenti Company. DREW & Co.'s mill is running on the Idado. New discoveries are being made in Bruno. A ledge called the Lady Franklin, and owned by BOHEM MARIDS & Co., is thought to equal the Miners' Rest. The Spiritual ledge continues to show rich rock and abundance of it."

BULL RUN.

A letter, dated November 19, says: "I have been superintending the last week in this place, and you can bet we have mines here that are richer, more extensive, and more numerous than they are at White Pine or Mineral Hill."

SPRUCE MOUNTAIN.

The Elko *Independent*, Nov. 26th, says: "This district is forty miles southeast of Humboldt Wells. J. B. OSBORNE has a shaft down 120 feet, following a very rich silver-bearing lead. On the side of the mountain below is an old incline showing the characteristics of those in the mining regions of Mexico and South America. In addition, later developments have proved that this is one of the richest countries yet discovered in Eastern Nevada, as the Latham, Schuyler, or Orborne mines will prove."

New Mexico.

THE BURRO MINES.

A correspondent of the Colorado *Tribune* writes as follows from Burrow Mines:

"RALSTON, N. M., Nov. 21.

"Our party arrived here on the 12th instant. The Valley of the Rio Grande, the country over which we passed from Santa Fé to Messilla, is one of the finest agricultural and pastoral valleys in the world, and undoubtedly would be one of the most prosperous if occupied by people of enterprise and industry. The population is composed mostly of native Mexicans, a sad intermixture of Castilian and Indian, with perhaps fourteen-sixteenths of the latter, in a half civilized state, living closely together in towns scattered through the valley, say from six to twenty miles apart, tilling just land enough to produce a bare subsistence. Some of them have considerable herds of cattle, sheep and goats. Each town is supplied with a church, and the people are ardent supporters of the Catholic faith, and on certain days collect together for the purpose of doing penance and receiving general absolution. The hardest of hardened old sinners, whose crimes have escaped the strong (or rather weak) arm of civil law, are required to cancel their crimes by lashing, cutting, bruising, gouging, bumping, bleeding and howling, until their bodies and limbs would need no further preparation for a French sausage factory. They are then 'carried from the field,' as they say, thoroughly purged and purified from all sin. Verily the way of the transgressor is hard in their church. If the same practice could be applied in all churches and out of them, what a season of prosperity the doctors and surgeons would have. From Messilla to the Burro mines, a distance of 120 miles, we passed through a sparsely settled country, with great abundance of grass, and occasionally water and timber. This road nearly spans the main Rocky Mountain belt, without hardly raising a hill, passing through an open, grassy plain and an easy grade from the Rio Grande to this point. The mountains are in detached ranges, and seldom above an altitude of 10,000 feet, with none of the grand old snow peaks in sight, to send forth through these thirsty plains the rippling brook or the mighty river. Yet twice in the year, summer and winter, this country is nearly deluged with rains, which send forth vegetation to a growth that would astonish the people of the broad prairies of Illinois and Iowa."

Utah.

THE MINES MOVING ALONG.

"We learn from Mr. STEVENSON," says the Salt Lake *Tribune*, "that there are seventeen applications for patents for mineral lands aleady on his hands, and more are coming. Inasmuch," continues our contemporary, hopefully, "as men will not go to the trouble and expense of patents, unless they are sure that they have a safe and 'a good thing,' which will repay them for all, these applications are so many certificates of the *bona fide* character of Utah mines. Seventeen applications for patents through one individual within a few months from the first developments of a locality like Utah, speak largely for the character of the country. West and South the discoveries have already progressed very largely, and this week we receive news of the operations of a company of Cache valley—the stronghold of orthodox opposition to the mineral wealth of the country. Thus, to get scriptural on the subject, we are saying to the North 'give up, and to the South, keep back.' The South and West have already yielded largely, and considerable developments would, doubtless, ere this have been made in the northern part of our Territory, but for the fact that the mountain ranges and cañons supposed to contain the precious metals are in such close proximity to the settlements that prospectors have felt shy of venturing over them with a fanatical and unreasoning hostility so close at hand. There are, however, parties in the north who have broken through the influence of the priesthood, and who are determined to operate in spite of all threats, and take the consequences. The parties we have already referred to, are operating in Providence cañon; while in the vicinity of Willard City, a few miles from Ogden, Mr. BAKER, of the former city, has made about a score of discoveries of what promise to be excellent leads, and he is making more every week. Thus the work of dovelopment rolls on."

Idaho.

The Owyhee *Avalanche*, Nov. 26, has the following mining items: "Fine-looking ore is now being taken from the Oro Fino, which, we understand, will supply both the Cosmos mill and the Webfoot The Belgium shaft is now down fifteen feet, at which depth the ledge, which has hitherto been somewhat broken up, is developing into a well-defined vein, nearly two feet in width, and which, judging from present indications, will pay handsomely. The Red Mountain has developed into a fine solid vein, from eighteen to twenty inches wide. We are informed that the last ore, worked at the Cosmos mill, panned out satisfactorily, and that another batch of twenty-five tons will be worked in a few days. The Potosi tunnel, back of our office, is now in 200 feet, showing a well-defined vein of good-looking quartz, increasing in width. Houses are being built, and things fixed up in tip-top order at the Chipmunk. A house has been erected over the shaft of the Illinois Central, owned by SANDS & Co. The shaft is nearly forty feet in depth. They intend to sink it sixty feet deeper, and then stope out the ore. Mr. PECK is improving the fine weather in building a commodious house over the shaft on the Belle Peck mine. The shaft is 4x8 feet, substantially timbered, and is now thirty-five feet deep, at the bottom of which the vein is from twelve to sixteen inches wide. Silver predominates, although considerable gold is yet discernible in the ore. Superintendent PHEBY is vigorously driving work ahead on the Corduroy. Some parties are at work on a ledge a short distance below the Belgium, and are said to be getting an encouraging prospect. Operations are going on as usual at the Idea, Elmore, and Golden Chariot. The timbers are all on the ground for the new hoisting works at the latter mine, and a force of carpenters are at work framing, etc."

THE ALTURAS MINES.

A correspondent of the *Statesman*, writing from Rocky Bar, November 22, says: "At Atlanta City, JOHN L. TILLMAN has commenced work on the 'Stanley,' formerly the 'Lucy,' under the most favorable auspices. The ledge is looking splendidly, and bids fair to eclipse the most sanguine expectations of its fortunate owners. This is the mine recently sold in London by Messrs. MATTINGLY & BISHOP. No better man could have it in charge than JEHN L. TILLMAN, who, I understand, has let the contract for tunnelling to Mr. JOHN TONKIN, an old miner, and one of the best in Idaho Territory.

"At Red Warrior, Mr. RICHARD THOMAS, with a gang of good miners, will work the 'Wide West,' with great benefit to himself and all parties concerned. I have been unable to get the exact figures of the last run made from that mine a few weeks ago, but am told it was highly satisfactory.

"The 'Idaho' mine is good as ever, and improving in richness and extent as the work progresses. The last run from this mine, made a few days ago by Messrs. SETTLE, DERRICK & JOHNSTON, paid $200 to the ton. This mine, as all your readers know, is one of the best in the Territory, if not on the coast.

"There will not be an idle man in the county this winter, but all will be at work opening up their mines and taking out quantities of very rich ore. Next summer bids fair to be the most lively ever known in this county."

Minnesota.

THE VERMILLION LAKE MINES AGAIN.

The expedition which started up from Duluth, on the 17th of August last, to make another effort to develop and prove the Vermillion Lake gold field, says the *Minnesotian*, "returned on Wednesday evening last, Nov. 16th, having been gone three months. Those who returned were Professor RICHARD EAMES; GEORGE P. HARRIS, the Recorder of that mining district; HERMAN WELTON; L. G. PROCTER, the machinist; and NILES PETERSON, miner. They walked from Vermillion in eight days, carrying their packs, and report the road quite passable for this season of the year. During the stay of the party there they put up two buildings, one 25x40, and the other 18x16, from lumber sawed by their mill; and made various preparations for the winter sojourn, which they contemplate 'as soon as the snow flies.' They built two large furnaces for desulphurizing the gold ores, and a furnace for drying the clay and sand, wherewith to build the furnaces. Their stock of provisions being nearly exhausted, they concluded to come back for supplies and to visit their families, intending to return as soon as possible and work out the gold problem—of the profitable solution of which none of the expedition seem to entertain any doubt. The reticence evinced by the whole party as to the result of their tests, their confidence, and their evident determination to see the thing through, and 'go better,' the entire absence of gas, and the evident confidence of the whole party, augurs well for future results."

MARKET REVIEW.

The Coal Trade.

NEW YORK, Dec. 16, 1870.

WHOLESALE.—There has been a fair business doing the past week, mostly from near-by men, and at an advance of from 50 to 75c. on our quotations, which we do not see fit to change in consequence of the disturbed state of affairs. There have been very few, if any, Eastern buyers in the market. The strike announced by us last week as having been inaugurated in the northern coal fields, remains intact, and the Miners' Association, has ordered the general suspension for the 24th inst. Whether the Association will be able to control the entire mining population, and thus carry the whole coal-producing regions with them, is a question of doubt with the many, and the course that the price of coal will take depends upon the thoroughness of the strike. There is a great deal of speculation in this market, most of the dealers preferring to hold their coal for better prices; others who have less faith in high prices, sell at the advance noted above. Dealers are active in seizing any pretense for excitement, and all kinds of wild rumors are afloat in the market, more or less for the purpose of frightening buyers. Many of them have no foundation, and have their origin in Trinity Building. A serious accident happened last evening on the "Bay Bridge," of the Central Railroad, which has effectually cut off all communication with Port Johnston; hence these dealers, such as the Wilkesbarre Coal and Iron Co., PARDEE & Co., and others who make this their shipping point, are cut off from receiving supplies. This will certainly retard large shipments of coal, should it take any great length of time to repair damages. Some estimate that it will take two weeks to put the road in running order; others seven days, while the Company, we believe, claim to be able to transport passengers by Tuesday next. Just at this time, an accident of this kind is particularly aggravating, inasmuch as the operators would get as large an amount of coal to tide-water as possible before the general strike comes on. This they would be unable to do, as the Railroad Company refuse to receive shipments; hence operations have to stop at the mines. Upon the length of time it takes to repair this accident, depends its influence on the market.

We would repeat our advice to dealers, offered last week. If you want coal now, don't be afraid to pay the advance asked. Interested parties will not permit a decline this winter, and the existence of the strike precludes the possibility of a decline.

We give the following quotations of coal for what they are worth. Prices are only good from day to day.

G. B. LINDERMAN & Co. quote Sugar Loaf Lehigh Stove, $6 00; Broken and Egg, $5 50, at Elizabethport. Their superior Franklin Coal at same rates.

C. A. BLAKE & Co. are offering New England Red Ash Coal (a great favorite) at $6 00 for Stove, $5 75 for Broken and Egg, on board at Amboy; freight to New York 60 cents.

Delaware & Hudson Canal Co. offer their coal at $6 50 Stove, $6 00 Broken, $6 25 Egg, hoisted at New York.

FREIGHTS.—Vessels are in good supply, but freights are scarce and very low. Many vessels are preparing to lay up for the winter.

RETAIL.—Dealers are not forcing business, preferring to wait for better prices.

ITEMS.

It is with emotions of deep regret that we are called upon to announce to our readers the death of JAMES H. LYLES, Esq., for the past three years the agent of the Honey Brook Coal Company of this city. Mr. LYLES was for many years Vice-President of the Scranton Coal Company, which position he filled with much honor to himself and great satisfaction to the company. It has been our happy lot oftentimes to consult him on many questions of importance in regard to the Coal Trade, statistical and otherwise, and we rarely erred in accepting his judgment. At the time of his death, Mr. LYLES was Secretary of the Lehigh Coal Exchange. This Association met to-day and passed resolutions of respect and condolence. Many remarks were also made paying a high tribute to his memory. Mr. LYLES was at business on Tuesday. He died at his residence in New Brunswick yesterday morning.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending Dec. 10, 1870, compared with week ending Dec. 11, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila & Reading R.R.†	....	3,393,324	....	2,984,253
†Schuylkill Canal	....	675,764	....	542,466
†Lehigh Valley R. R.	....	2,015,226	....	2,210,020
Lehigh & Sus. R. R.	23,888	868,068	33,663	1,022,977
Lehigh Canal	95	604,218	6,845	788,340
Scranton North	....	412,804	....	664,253
" South	....	965,324	....	1,673,601
Penn. Coal Co., rail	14,320	905,459	4,094	1,048,184
" " canal	....	18,706	....	16,602
Del. & Hud. Canal Co.	516	1,206,240	....	1,292,675
" " R. R.	10,330	159,693	8,158	499,841
" " south	1,249	120,514	1,950	415,647
By Jefferson R. R.	....	....	208	14,447
Shamokin	8,440	450,553	8,057	46,443
Trevorton	2,586	3,504	....	67,371
Lykens Valley Coal Co.	1,249	78,313	....	155,363
Wyoming South	....	364,705	....	326,645
Wyoming North	....	76,308	....	....
P. N. Y. C. & R. R. Co.	....	....	....	27,151
Williamstown, Co'y	2,033	197,893	5,259	286,561
Short Mountain	2,486	104,642	....	....
Big Lick Colliery	....	....	....	....
Total	67,036	12,684,939	68,467	15,360,876
1869			67,036	12,684,939
Increase week and year.			1,431	2,675,937

* Less coal transported for Company's use and Bituminous coal.
† These figures are for the week and fiscal year, ending November 30. See table below for tonnage since Dec. 1st.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Dec. 10, 1870, compared with week ending Dec. 11, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	....	....	30,217	938 295
C. & O. Canal	....	....	1,634	596,038
H. & B. T. R. R.	6,881	343,376	6,909	294,384
Harrisburg & D.	....	....	....	276,560
L. V. R. R.	....	21,237	....	13 847
P. & N. Y. C. & R. Co.	....	....	....	239,660

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad, Saturday, Dec. 10, 1870;

From St Clair	21,908 05
" Port Carbon	3 013 07
" Pottsville	3,102 12
" Schuylkill Haven	13,275 06
" Auburn	7,335 14
" Port Clinton	7,341 05
" Allentown and Alburtis,	273 08
" Harrisburg and Dauphin	12,348 16
Total paying freight	68,598 14
Coal for Com'any's use	2,364 09
Total for week	70,963 03
Previously this year	30,652 17
Total	101,616 00
To same time last year	159,233 07

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Saturday, December 10, 1870.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	13,761 04
" Port Clinton	1,279 00
Total for week	15,040 04
Previously this year	14,400 05
Total	29,440 09
To same time last year	....

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending Dec. 10, 1870:

	Tons.
For week	12,348 16
Previously this year	5,591 00
Total,	17,939 16
Same week last year	11,086 17
For Thursday, Dec. 1	.....
Previously	.....
Total for year beginning Dec. 1.	.....
Same date last year	.....

Delaware, Lackawanna, and Western Railroad.

COAL Transported for the week ending Saturday, December 3, 1870.

	WEEK. tons. cwt.	YEAR. tons. cwt.
Shipped North		664,283 17
Shipped South		1,673,601 00
Total		2 337,884 17
For the corresponding time last year,		
Shipped North		412 804 11
Shipped South		986,324 15
Total		1,399,129 15
Increase		938,751 06
Decrease		

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending December 3, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons cwt	WEEK, 1869. tons cwt	YEAR, 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	22867 08	14058 11	1188534 08	799802 03
Upper Lehigh Region	2821 03	....	14387 13	77456 08
Mahanoy Region	....	....	381 9 05	2705 07
Hazleton Region	3382 03	133 15	317631 06	122794 13
Beaver Meadow Region	1360 17	....	146344 12	97646 08
Mauch Chunk Region	10850 1.	10737 17	23 .34 01	429573 19
Totals	42292 0.	24923 03	2040068 05	1519679 04
Increase	17369 02	....	5203:9 01	....
Decrease	....	....	....	....
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	33853 01	23888 15	1022977 17	853068 04
Forwarded East of Mch Chunk by Canal	6348 09	95 14	798340 06	604218 13
Delivered at and above Mauch Chunk	1690 15	531 10	44188 10	33491 05
Delivered to L. & B. R. at Plymouth Bridge	....	415 04	184261 12	18839 19
L. V. R. R. at Sugar N.	....	....	....	5151 03
Totals	42292 03	24933 03	2040068 05	1519679 04
Of the above there was transported on acc'nt of L. C. & N. Co.	15652 06	11197 16	288597 01	467194 18
W.-B. C. & I. Co.	17697 17	7310 14	583:77 06	390380 07
Totals	31250 03	18508 10	887917 07	850775 05
Increase	12741 13	....	37142 02	....
Decrease	....	....	....	....

Pennsylvania Coal Company,

Shipments of Pittston Coal for the week ending Dec. 10, 1870.

	1870. WEEK.	1870. YEAR	1869. WEEK.	1869. YEAR.
By Railway	4,094 16	1,068,184 11	14,320 02	905,459 02
" Canal	— —	16,602 28	— —	18,706 15
Total	4,094 16	1,084,787 09	14,320 02	924,165 00
Increase, 1870, 160,621 09 tons.				

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, December 10, 1870.

	WEEK.	SEASON.
North	1,646 14	1,930,747 11
South	1,950 86	415,646 18
Total	3,597 00	2,346,394 09
CORRESPONDING TIME IN 1869:		
North	31,636 17	1,325,486 08
South	1,248 19	118,747 17
Total	32,935 16	1,441,264 05
Decrease North	30,040 03	Inc. 605 281 03
Increase South	701 07	Inc. 296,849 01
Total Decrease	29,338 16	Inc. 902,130 04

The following is a statement of coal transported by the Delaware and Hudson Canal Company, for the week ending December 10, 1870.

	WEEK.	SEASON.
By Del. and Hud. Canal		1,292 675 00
By Railroad	8,198 00	499,821 00
South	1,950 00	415,647 0.
Total	10,148 00	2,208,143 00
By Jefferson R.R.	208 00	1e,447 00
Corresponding time in 1869	10,356 00	2,222,620 00
By Del and Hud. Canal	516 00	1,.05,280 00
By Railroad	10,330 00	1.9 693 00
South	1.2.9 00	120 514 00
Total	12,095 00	1,436,487 00
Increase	736,145 00	

Summit Branch Railroad Company.

The following is the quantity of Coal shipped from Williamstown Colliery, for week ending Saturday, December 10, 1870

	5,239 13
Same time last year	2,033 05
Decrease, Tons	3,206 08
Total amount shipped to date	286,560 01
Same time last year	197,893 13
Increase, Tons	88,666 11

Report of Coal Transported over Lehigh Valley Railroad

Three days ending December 10, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	9,810 16	14,050 11
" Hazleton	37,481 01	53,919 07
" Upper Lehigh	143 03	153 10
" Beaver Meadow	10,577 12	16,453 07
" Mahanoy	8,537 08	15,121 06
" Mauch Chunk	189 13	263 10
Total Anthracite	65,737 13	99,963 11
Bituminous Coal from all sources		
Total by rail and canal	65,737 13	99,966 11
Same time last year	50,224 08	91,990 19
Increase	15,513 05	7,975 12
Decrease		
Forwarded East from M'h Chunk by rail	54 516 03	80,808 09
Same time last year	46,637 19	85,764 05
Increase	7,908 04	
Decrease		4 955 11

RECAPITULATION.

Forwarded East from M'h Chunk by rail	54,516 03	80,808 09
To N. C. R. R., at Mount Carmel		3,423 15
Forwarded North from L. & B. Junction	5,147 06	7,687 01
To L. & S. R. R. at Packerton for rail	148 04	272 18
Delivered at M'h Chunk	21 13	59 10
Delivered on line of road above Mauch Chunk	462 17	543 13
Delivered above M. Chunk for use of L. V. R. R.	1,076 07	1,746 13
To L. & S. R. R., at P'n Hav., for railroad		
Do. for canal	3,087 09	6,417 05
At M. Chunk for canal	1,314 12	2,431 02
Total Anthracite	65,737 13	99,966 11
Bituminous Coal		
Total all kinds	65,737 13	99,966 11

Shipments of Cumberland Coal

for the week ending Saturday, December 10, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M.	12 00	.....	12 00
Borden	3,402 17	.....	3 402 17
Consolidation	8 466 03	212 01	8,668 04
Spruce Hill	304 02	.....	304 02
Midlothian	508 16	244 08	753 24
H. and Baltimore	110 17	1,0.2 06	1,138 03
do Va M	1,516 00	.....	1,516 00
V C & I Co	1,143 15	.....	1 143 15
G. C. C. and I.	1,304 02	114 07	1,418 09
Big Vein	1 301 13	.....	1,891 13
Maryland	1,775 17	41 12	1,817 09
American	1,577 04	.....	1,577 04
Atlantic	1,090 16	.....	1,090 16
Piedmont	1 719 10	.....	1,719 10
Swanton	978 00	.....	978 00
Barton	962 00	.....	962 00
Potomac	1,329 10	.....	1,329 10
George's Creek M. C.	501 14	.....	501 14
Franklin	1,633 01	.....	1,891 13
Total week	30,217 17	1,634 14	31,852 11
Previous	968 078 02	194,403 14	1,562.481 16
Total year	998,29519	596,038 08	1,594,334 07

Statement of coal transported over the Cumberland and Pennsylvania Railroad during the week ending Saturday, Dec. 10, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL. Tons.	C. & O. CANAL. Cwt.	B. & O. R. R. Tons.	B. & O. R. R. Cwt.	TOTAL. Tons.	TOTAL. Cwt.
1870	1,422 13		26,578 01		28,000 14	
1869			22,503 10		12,503 10	
Increase	1,422 13		4,074 11		5,497 04	
Decrease						

YEAR.

YEAR.	C. & O. CANAL. Tons.	C. & O. CANAL. Cwt.	B. & O. R. R. Tons.	B. & O. R. R. Cwt.	TOTAL. Tons.	TOTAL. Cwt.
1870	519,542 10		841,533 12		1,361,076 02	
1869	573.243 17		957,109 09		1,530,3.3 05	
Increase						
Decrease	53,701 07		115,575 17		169,277 04	

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK, December 10. R. A.	AT NEW YORK, December 10. W. A.	AT PHILADELPHIA, December 9. R. A.	AT PHILADELPHIA, December 9. W. A.
SCHUYLKILL.				
Lump	$ —	$5 00	4 75	4 50
Steamer	— —	5 00	— —	4 50
Broken	— —	5 50	— —	4 50 to 4 75
Egg	5 50 to 6 00	5 00 to 5 25	— —	4 50 to 4 75
Stove	5 50 to 6 00	5 25 5 50	— —	4 50 to 4 75
Chestnut	4 00 to 4 50	4 00 4 25	— —	4 25 to — —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	5 25	— —	— —	— —
Broken	5 10	— —	— —	— —
Egg	5 10	— —	— —	— —
Stove	5 60	— —	— —	— —
Chestnut	4 35	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A. 6 00	— —	— —	— —
New England	" — —	— —	— —	— —
Locust Dale	W. A. 5 50	— —	— —	— —
Honey Brook, Leh	W. A. 4 00 to 5 00	— —	— —	— —
Spring Mountain	" 4 00 to 5 00	— —	— —	— —
Sugar Creek	" 4 00 to 5 00	— —	— —	— —
Sugar Loaf	" 4 00 to 5 00	— —	— —	— —
Old Comp'y's	" 4 00 to 5 00	— —	— —	— —
Cross Creek	" 4 00 to 5 00	— —	— —	— —
Room Run	" — —	— —	— —	— —
Girardville	" — —	— —	— —	4 75
McMichael	" — —	— —	— —	4 75
Shamokin	" 5 50	5 25	— —	— —
Lykens Valley	" — —	5 75	— —	— —
Broad Top	" 5 50	— —	— —	— —
Hill & Harris	" — —	4 75	— —	— —
Henry Clay	" — —	5 00	— —	— —
Powelton	" 5 50	— —	— —	4 75

[*Dealers in these coals may be found in our advertising columns.]

Prices for Coal at Mauch Chunk.

December 1870.

	F.L.	Bro.	Gra.	Eg.	Sto.	Chest.
Lehigh	$3 00	$3 15	$3 75	$3 75	$4 00	$3 00
Wilkesbarre	3 00	3 75	3 75	3 75	4 00	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein..f.o.b. at Phila. $5 00
Lemon " " 4 75
Cumberland Vein Coal " " 4 75
Consolidation Coal Co.'s on board N. Y. 7 00
Maryland Coal Co. " 7 00

Company Coals.

December, 1870.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	4 25	4 25	4 50	4 50	5 25	4 25
Pittston at Weehawken	— —	— —	— —	— —	— —	— —
Lackawana at do	4 25	4 30	4 40	4 50	4 80	4 10
Wilk'b're at Hoboken	— —	— —	— —	— —	— —	— —
Old Co. Lehigh at Pt. Johnston	5 15	4 65	4 65	5 15	4 15	4 00
Lehigh at E. Port	— —	— —	— —	— —	— —	— —

For freights to different points, see "Freights."

Prices at Baltimore—December, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$4 80@— —
Pittston and Plymouth, do	5 60@5 75
Shamokin Red or White Ash, do	— —@6 00
Lykens Valley Red Ash, do	6 25@— —
Zerba Valley	5 25@— —
Treverton	6 00@— —
By retail, all kinds per ton of 2240 lbs.	7 25@8 25
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 60@4 75
Fairmont and Clarksburg gas, f. o. b. at L. Point	6 00@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

December, 1870.

George's Creek and Cumberland f. o. b. for shipping..$4 40

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@5 50
Lykens Valley	— —@5 25
Shamokin Red or White Ash	— —@5 75
Trevorton and Zerba Valley	— —@5 00

Prices of Gas Coals.

December, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 41-43 Pine st., N.Y.

	Duty, $1 25, gold. Coarse.	Slack.
Block House	$1 75 @— —	
Gowrie	1 75 @— 75	

Corrected by Bird, Perkins & Job, 80 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@— 80
Lingan	1 75	@— 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@— 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Currency.
Westmoreland	7 75 @8 00
Fairmount Gas Coal Co. of N. Y.	7 50 @— —
Despard Coal Co.	$7 50 @— —
Penn.	7 75 @8 00
Newburg Orrel Gas	— — @— —
West Fairmount Ga Caoal	8 00 @— —

AT PHILADELPHIA.

Powelton $7 80

Prices of Foreign Coals.

December, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street New York.

Liverpool Gas Caking	$ 9 00@— —
" " Cannel	11 50@12 50
" House	— —@15 00
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel "	18 00@20 00

Per ton 2,000 lbs. delivered

Freights.—DECEMBER, 1870.

TO EASTERN PORTS.	From Philada.	From E. Port and Port Johnston.	From Newburg	From Rondout
Amesbury	$2 50	$2 00	$	$
Bangor	2 30	1 60	1 60	
Bath	2 30	1 75	— —	
Boston	2 40	1 85	2 25	1 90
Bridgeport	1 75	1 00	1 10	1 20
Bristol	2 00	1 40	1 40	
Cambridgeport	2 75	2 00		
Derby	2 00	1 20		
Dighton	2 30	— —	1 45	
East Cambridge	2 35	2 00		
Fall River	2 00	1 40	1 40	
Hackensack	1 75	1 00		
Hartford	2 50	1 50		
Jersey City	1 40	60		
Middletown	2 25	1 25		
Mystic	— —	1 25	1 30	
New Bedford	2 00	1 40		
Newburyport	2 65	1 85		
New Haven	1 90	1 00	1 10	1 20
New London	1 75	1 25	1 25	1 30
Newport	2 00	1 40	1 40	
New York	1 35	60	70	
Norwalk	1 80	1 00	1 05	
Norwich	2 00	1 30	1 35	1 40
Pawtucket	2 30	1 50	1 60	
Portland	2 30	1 50		
Portsmouth, N. H.	1 45	1 85		1 85
Providence	2 00	1 25	1 45	1 45
Rockport	2 10	1 65		
Saco	2 25	1 75		
Sag Harbor	1 70	1 20	1 30	
Salem	2 30	1 65	2 25	2
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 30	1 75		
Warren	— —	1 40	1 45	
Washington	1 25			
TO RIVER PORTS.				
Albany		90	60	
Catskill		— —	50	
Cocksackie		— —	50	
Coeyman's		— —	75	
Cold Spring		— —	35	
Fishkill		— —	30	
Haverstraw		50	60	
Hudson		— —	50	
New York		— —	70	
Nyack		60	60	
Poughkeepsie		— —	35	
Rhinebeck		— —	30	
Rondout		— —	— —	
Saugerties		— —	40	
Sing Sing		— —	75	
Stuyvesant		— —	55	
Tarrytown		80	75	
Troy		90	75	
West Point		— —	35	
Yonkers		40	60	

Foreign and Provincial Freights.

December, 1870.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons £14 00@£15 00
Liverpool, 5 per cent primage 13s @15. ton

TO NEW YORK.

Provincial

Sidney	$3 00
Lingan	3 00
Cow Bay	— —
Port Caledonia	3 25
Little Glace Bay	3 00

TO BOSTON.

Sydney	$2 70
Lingan	2 70
Cow Bay	— —
Port Caledonia	3 00
Little Glace Bay	2 75

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon $2 00
Less drawback of 50 cents on all Coal shipped east of New Brunswick and south of Cape Henry,

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 76
C. R. R., N. J., Easton to Elizabethport	1 08
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 16

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 76
C. R. R., of N. J., Easton to Pt. Johnson	1 11
Shipping expenses	25
Warfage	10
Total	$2 23

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 76
Morris & Essex R. R. Easton to Hoboken	1 11
Shipping expenses	25
Warfage	10
Total	$2 23

TO SOUTH AMBOY.

L. V. R. R.	76
B. & D. R. R.	} 1 04
Cam. & Am. R. R.	
Shipping Expenses	25
Total	1 00

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	76
C. RR. of N. J. Easton to Elizabethport	1 08
Shipping expenses	25
Wharfage	10
Total	$2 19

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 15
" Port Carbon	1 18
" Port Clinton	1 08

TO NEW YORK.

From Schuylkill Haven	$1 75

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris " Freight, Towing	2 10
Total	$ 2.50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris " Freight	2 05
	2 45
For re-shipment	2 19

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	25
Freight	1.25
Towage	20

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1 05
Total,	$ 2.10

For Re-shipment—30 extra for shipping, less 10 cents. drawback.

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven,	$ 40
Bridgeport,	40
Southport,	40
Westport,	40
Norwalk,	40
Stamford,	40
	Per Boat.
Greenwich,	$70 00
Port Chester,	80 00
Mamaroneck,	70 00
Glen Cove,	60 00
New Rochelle,	55 00
East Chester,	60 00
West Chester,	30 00
White Stone,	30 00
College Point,	25 00
West Farms,	25 00
Flushing,	30 00
Harlem and Mott Haven,	20 00
Port Morris,	20 00
Ninety-first street and Astoria,	16 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS.

Boats of 150—250 Tons.	Per Ton.
To Manhattanville,	8 cents
Spuyten Duyvil,	8 "
Yonkers,	9 "
Hastings,	10 "
Piermont,	12 "
Dobbs' Ferry,	12 "
Nyack,	14 "
Tarrytown,	15 "
Sing Sing,	16 "
Croton Landing,	17 "
Haverstraw,	17 "
Verplanck's,	17 "
Peekskill,	18 "
West Point,	20 "
Cold Spring,	20 "
Newburgh,	18 "
Poughkeepsie,	22 "
Rondout,	22 "
Boats of 100 Tons.	*Per Boat*
To Manhattanville, and Return,	$11 00
Spuyten Duyvil, "	13 00
Yonkers, "	15 00
Sing Sing, "	20 00
Peekskill, "	25 00

METALS.

NEW YORK, December 16, 1870.

IRON.—Duty: Bars, 1 to 1¼ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.: Boiler and Plate, 1¼ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, 9 ℔ ton; Polished Sheet, 3 cents ℔ lb.

	Store Prices.
Pig, Scotch No. 1, ℔ ton	34 00@36 00
Pig, American, No. 1	— —@31 00
Pig, American, No. 2	— —@30 00
Pig, American, Forge	25 00@27 50
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	85 00@100 00

	Store Prices, Cash.
Bar, Swedes, ord'y sizes, less 5 ℔ ct.	— —@110 00
Bar, Refined " "	77 50@ 82 50
Bar, Common " "	72 50@ 75 00
Scroll " "	97 50@125 —
Ovals and half-round " "	97 50@125 —
Rand " "	92 50@ 95 00
Horse Shoe " "	95 —@ — —
Rods, ¼ to 2-16 inch " "	82 50@ — —
Hoop " "	102 50@140 00
Nail rod, less 5 ℔ ct.	6¾—@ — —
Sheet, Russia, as to Nos. (gold)	10½@—11
Sheet, Single, D. and T. Common,	4½@— 6
Sheet, Galv'd, Nos. 14 to 26 and 29, 13@14	10 and 12c. Nos. 27, 28,
Rails, English (gold), ℔ ton	57 00 @59 00
Rails, American, at Works in Pa	70 00 @71 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents or lb; over 11 cents, 2½ cents ℔ lb, and 10 ℔ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ℔ lb		— 15 @— 18
English Spring (2d and 1st quality)		— 7 @— 10
English Blister (2d and 1st quality)		— 10 @— 17
English Machinery		— 11½@— 14
English German (2d and 1st quality)		— 13 @— 15
American Blister "Black Diamond"		— — @— 12
American, Cast, Tool	do.	— 16 @— 17
American, Spring,	do.	— 9 @— 11
American Machinery,	do.	— — @— 12
American German,	do.	— 9 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 30
Copper Bolts	— @— 32
Copper Braziers, 16oz. and over	— @— 32
Copper Nails	— @— 37
Copper, Old Sheathing, &c., clean	19 @— 20
Copper, Chili Pig	— @—
Copper, American Ingot	22½@— 22½
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cents ℔ lb; Pipe and Sheet, 2½ cents ℔ lb.

Galena, ℔ 100 lbs	$—	@— —
Spanish (gold)	6 25	@6 37½
German, do.	6 30	@6 37½
English, do.	6 30	@6 62½
Bar (net)	7 25	@7 50
Pipe (net)	7 25	@7 50
Sheet	7 75	@8 00

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent. ad val.

	Gold ℔ lb.
Banca	37½@38
Straits	33 @33½
English	— @33

PLATES.

Fair to Good Brands.	*Gold.*	*Currency.*
I. C. Charcoal, ℔ box	$8 25 @8 50	$9 25 @ 9 75
I. C. Coke	7 25 @7 50	8 00 @ 8 75
Coke Terne	5 75 @6 75	7 00 @ 7 25
Charcoal Terne	7 25 @7 75	8 50 @ 9 00

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ℔ 100 lb

	Gold.
Plates, Foreign, ℔ 100 lbs	$5 75 @ 6 12½
Plates, Domestic, ℔ lb.	8½@— 11½

REMARKS.

PETROLEUM.—The market for both crude and Refined has been very dull, but prices are without important change. Crude is steady at 12c. in bulk, with sales of about 3,000 bbls. in lots, in shipping order; we quote 15¾ @ 16c.; Refined has sold to a moderate extent at about previous figures; we note 6,500 bbls. at 22½ @ 23c., the lower price for re-sales of contracts; and about 15,000 cases on private terms. Naptha is firm, with sales since our last of about 3,000 bbls. at 9c.; and 3,000 cases, 14c., cash. In Philadelphia the market has been extremely quiet. We only hear of 4,000 bbls., December delivery, mainly at 22¼c., closing at 22½c.

COPPER.—The manufactures of Copper and Yellow Metal are steady at our quoted rates. Ingot is dull, and some holders evincing more disposition to realize, prices are somewhat irregular; the sales embrace about 300,000 ℔. Lake at 22¼ @ 22½c., cash.

IRON.—The market for Scotch Pig continues to present a very quiet appearance. There is a fair inquiry, but as the stock is light, business is restricted, and prices favor sellers. American is still neglected, and prices are nominally as before noted, viz.: $31 for No. 1, $30 for No. 2, and $25 @ $27 for Forge. There has been very little inquiry for either old or new Rails, but prices are unchanged; we quete English $57 @ $59, gold, and American $70 @ $71, currency, at the works in Pennsylvania. Refined Bar from store continues very dull, and nominally steady at our quotations—the Mill price is $75 there.

LEAD.—Pig is quiet but steady. We have only to notice the sale of 50 tons Spanish, at $6 35, gold. Bar and Pipe, 7¼ @ 7½c., and Sheet 7¾ @ 8c., net cash.

SPELTER.—The market remains very dull; 25 tons V. M. sold at 5¾c. gold, and 25 tons Silesian on private terms.

STEEL.—All descriptions are in good supply, and steady at our quotations.

TIN.—There has been renewed activity in the market for Pig, and higher prices have been paid. A telegram from London, of the 9th inst., quotes Straits 130s., and English 133s., which for the latter is a further advance. Sales have been made of 2,000 slabs Straits at 32½ @ 33c., now held at 33¼ @ 33½c. 65 tons English, 32¾ @ 33c., all gold, now firm at 33c., and 5 do. on private terms. Banca nominally 37½ @ 38c. Plates are in improved demand, and, with a considerable business, there is a better tone than before, though prices are without quotable change. The sales are 2,000 bxs. Charcoal Terne at $7 @ $7 37½c., as to brand, gold; 2,000 do. assorted Charcoal Tin at prices within our range, 550 do. I. C. Coke Tin on private terms.

ZINC.—We have only to notice small sales Mosselmann, from dealers' hands; at 7½ @ 7¾c. net gold; Am. Ox., 6½ @ 7c.; French, 10 @ 11c.; Sheet, 8¾@9c.; Manganese, 4 @ 4½c.

San Francisco Stock Market.

BY TELEGRAPH, SAN FRANCISCO, Dec. 13, 1870.—Without exception, all stocks on the Comstock list have advanced. Below are the quotations in full.

Yellow Jacket	37
Kentuck	no sales.
Chollar Potosi	76
Gould & Curry	81
Belcher	7½
Imperial	no sales.
Anacor	22
Crown Point	—
Savage	—
Hale & Norcross	—

The Slate Trade.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	$6 50@ 7 00
" green, 1st " "	6 50@ 7 00
" red, 1st " "	15 00@16 00
" variegated, " "	5 75@ 6 20
Pa. b'k and d'k blue, 1st qual., "	6 00@ 7 05

VERMONT SLATE TRADE.

Hydeville, Vt.

REPORT OF SLATE SHIPPED FROM HYDEVILLE, VT., VIA R. & S. RR., FOR THE WEEK ENDING DECEMBER 10, AND FOR THE YEAR 1870.

ROOFING SLATE.

	WEEK.	PREVIOUSLY.	YEAR.
Eagle Slate Co.	sqs. 140	5890	6030
Western Vermont Slate Co	—	86	86
Blue Slate Co.	130	1372	1502
The Evergreen Slate Co.	150	4870	5020
Forest Mining Slate Co.	..	215	215
West Castleton Slate Co.	..	90	90
E. D. Billings	16	263	279
R. M. Copeland	40	183	223
W. E. Williams	4	80	120
Forest Slate Co.	..	80	80
Total	516	13129	13645

MILL STOCK.

Eagle Slate Co.	114 boxes.
E. A. Billings	150 boxes.

FINISHED MANTELS.

West Castleton Slate Co. box.	43	152	195
Forest Mining "	63	125	188
Total	106	277	383

BILLIARD BEDS AND BLACK BOARDS.

Eagle Slate Co. box.	64	1350	1414
West Castleton Slate Co.	..	661	661
Western Vermont	12	54	66
E. A. Billings	..	78	78
Total	..	2143	2219

TILE.

Eagle Slate Co. bxs.	7	78	85
Western Vermont Slate Co.	....	....	

PENNSYLVANIA SLATE TRADE.

SHIPMENTS OF SLATE OVER THE LEHIGH VALLEY, AND LEHIGH AND SUSQUEHANNA R. R., AND THE LEHIGH CANAL:

For the week ending Dec. 10, 1870.

LEHIGH VALLEY R. R.

ROOFING SLATE.

Girard Slate Co.	— squares.
Jones & Williams	140 "
D. Williams & Co.	70 "
Saylor & Morgan	70 "
H. Williams	— "
Lehigh Slate Co	35 "
American Slate Co.	— "
Hope	35 "
Keystone	35 "
Locke	35 "
Total	420 "

SCHOOL SLATES.

D. Williams	6 cases.
Lehigh Slate Co.	14 "
Locke Slate Co.	— "
H. Kuntz	7 "
Total	27 "

BLACK BOARDS.

Yerkes & Martin	— "
Lehigh Slate Co	3 "

MANTELS.

Yerkes & Martin	26 "
Lehigh Slate Co.	13 "
Total	39 "

MILL STOCK.

R. Hughes	2 "
Jones & Williams	3 "
Philada. S. Mantle Co	1 "
	6

TILING, &C.

Lehigh Slate Co.	10 "
Yerkes & Martin	8 "
	18 "

LEHIGH AND SUSQUEHANNA R. R.

ROOFING SLATE.

Twin City Slate Co.	— squares.
N. Y. & Penn	— "
J. M. Coffin & Co	70 "
William Parry	— "
Mauch Chunk Slate Co.	— "
J. Beck & Co	65 "
Eagle Slate Co.	35 "
Continental	35 "
Total	205

	Dec. 10.	Previously.	Total for Year.
L. and S. R. R.	205	11,341	11,546
L. V. R. R.	420	24,453	24,873
Lehigh Canal	—	4,762	4,762
Total	625	40,556	41,181

Missouri Iron.

RESPECTING the development of the iron interests of Missouri, a correspondent of the Philadelphia *Press* says: "So encouraging is the progress so far as made in this direction, and so sanguine the hopes for the future, that it is expected that in a few years St. Louis, with her immense natural resources, and the influx of Eastern capital, will be not only a powerful rival of Pittsburg, but in reality the great iron and metal manufacturing city of the continent. The prospects of her attaining this latter distinction are indeed flattering. Located in a State abounding with nearly every useful metal known to mineralogy, and close to inexhaustable beds of coal suited for smelting and manufacturing purposes, she needs but one thing—skilled labor—to turn the metals from the furnaces into a thousand useful forms. That sufficient inducements will be offered to attract the skilled mechanic, and that in course of time skilled labor will grow up of itself in St. Louis, there is no reason to doubt. Missouri has been long celebrated, not only for its mineral wealth generally, but particularly for the abundance of a very superior quality of iron famous for its maleability and solidity. This interest has not been developed to any extent until recently. Heretofore two causes have operated against it. First. The difficulty and expense of smelting, occasioned by the absence of a suitable quality of coal for the purpose; and, Second. An insufficient monetary capital, occasioned by the reluctance of Eastern capitalists to invest. The first has been overcome by recent discoveries, and the latter will follow, in time, as a matter of policy. Already fifteen furnaces are in successful operation, representing a capital of $4,000,000, and many new companies are forming. With their influence operating it will be difficult to place any limit upon the development of the iron interests of Missouri."

Steam on Canals.

THE Troy *Times* describes as follows a new application of steam to canal boat propulsion, invented by Mr. MAIN, foreman of the Morgan Iron Works, New York: "A few days since, the canal boat George Barnard, fitted up as a propeller, arrived here from Nyack, and has been making a trial trip upon the Erie canal—working very satisfactorily, and evidently promising the most complete reform in the matter of canal navigation. The boat itself is an old one of the ordinary build, the only novelty about it being the motive power by which it is propelled, and the manner of its application. The method devised in the Barnard to fulfil the conditions required, and to overcome the difficulties, is to arrange an ordinary screw propeller in a cavity or opening situated in the bow of the boat. The opening is tapering in shape, and terminates about twenty feet from the bow. The propeller is driven by a simple upright engine, nine inches in diameter, with 12-inch stroke, which is supplied by steam from an upright boiler, four feet in diameter by ten feet high, the boiler being fed by an upright steam pump, the whole being very compact and occupying a space on the floor of the boat only ten by four feet, and, including water in the boiler, weighs only six tons. The opening for the screw reduces the displacement only six tons, so that the application of steam power reduces the carrying capacity only ten tons. The consumption of fuel will be one ton of coal in twenty-four hours. The boat can be handled by three hands, or four, if running all night. The machinery only takes ten tons from the carrying capacity, and has been found to be thoroughly practicable in every respect, and can be applied with advantage to boats now running or to new ones, making them independent of towage, either on canal or river. Those who saw the Barnard at work believe that a new era is soon to dawn upon the commerce of our canals."

WHITE PINE produced bullion to the value of $151,005.13 during the month of October.

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Professor Huxley on Coral Reefs.

PROFESSOR HUXLEY delivered the first of a second series of "Science Lectures for the People," at the Hulme Town Hall, Manchester, last Friday evening, on the subject of "Coral Reefs." The hall was crowded, and many working men, who were anxious to hear the lecture, were unable to find even standing room. On the motion of Professor ROSCOE, Mr. THOMAS ASHTON was called to the chair.

Professor HUXLEY, who was received with loud cheering, said that the subject on which he wished to address them related to what they knew as coral and coral reefs. Under the head of coral there were included two very different things. The one was the substance which he imagined a great number of them had champed when they were very much younger than they were now—the common red coral—which was used so much, as they knew, for the edification and delectation of children of tender years. It was also employed for purposes of ornament by those who were older and, as some thought, might know better. (Laughter.) The other kind of coral was a very different substance, and, for the sake of distinction, might be called the white coral. It was a material which most assuredly not even the hardest-hearted of baby farmers would give to a baby to chew—(laughter)—and it was a substance which was to be seen only in the cabinets of curious persons, or in museums, or may be over the mantelpiece of seafaring men. But, although the red coral, as he had mentioned, had access to the very best society; and although the white coral was, comparatively, a despised product, yet in this, as in many other cases, the humbler thing in reality was the greater, and the amount of work which was done in the world by the white coral was absolutely infinite, as compared with that effected by its delicate and pampered neighbor and friend. Each of these substances, the white coral and red, have never had a relationship to the other—they were, in a zoological sense, cousins, each being formed by the same kind of animal in what was substantially the same way. Each of these bodies was, in fact, the hard skeleton of a very curious and a very simple animal, more comparable to the bones of such animals as ourselves than to the shell of the oyster or creatures of that kind, for it was a hardening of the internal tissue of the creature. It was the internal substance of the body of a material which was exceedingly common, not only in fresh, but in sea water, and which was especially abundant in those waters which we knew as hard water—those waters which left a fur, for example, on the bottom of a kettle, a substance known as carbonate of lime. That material was contained in solution in the sea water, and it was out of the sea water, in which these creatures lived, that they got the lime needed for the formation of the hard skeleton. But of what manner were those creatures forming the hard skeleton? He dare say, in these days of keeping aquaria, in these days of locomotion to the sea-side, that many of them had seen one of those creatures which used to be known as the sea anemone, receiving that name on account of its general resemblance, in a rough sort of way, to the flower known as an anemone, but being a thing living in the sea, was qualified as a sea anemone. After describing, by diagrams, the polypes which were the originators of coral, he said these creatures were very voracious, and not particular to what they seized. Sometimes one would lay hold of a shell fish far too big to be tucked away into its stomach. In any ordinary animal a proceeding of this kind would give rise to a serious fit of indigestion. But this result did not happen in the case of the polypes, because when digestive difficulties of this kind arose, the polyp got out of them by splitting himself in two, and each half built itself up into a new creature; thus there grew up two polypes where previously there was only one, and the bone which stuck in the way lay between them. These creatures also multiplied themselves by buds. The result of this budding process was that by and by a group of polypes grew up together, associated together in a kind of co-operative store, each mouth helping to feed the body, and each part of the body helping to supply the various mouths. He thought it was as good a definition of a zoological co-operative store they could have. ("Hear," and laughter.)

But the polypes also multipled themselves in the form of eggs, which were passed out of the mouths of the creatures. These oval bodies travelled along by what were called vertabrite cilia or oars, and by their own action, and carried by the currents of the sea, until they settled on the sea bottom, and peopled in their thousands and millions a very large surface of the sea bottom. In fact, give them time, and there was no limit to the surface which they might cover. Having understood thus far the general nature of the polyp, the fabricator of both the red and white coral, he would lead them to consider a little more particularly how the skeletons of the red and white coral were formed. The red coral polyp perched upon the sea bottom, and from it sprung what might be described as a tree, every branch of which terminated with its polyp, it was a tree at the end of each branch of which was an open mouthed polyp instead of a flower. And as it grew, the carbonate of lime deposited assumed usually a fine pink or fleshy color. This formed the stem known as red coral. It grows at the bottom of the Mediterranean principally, at very great depths, and the coral fishers, very adventurous seaman, took out with them a drag net, no doubt, but roughly made, although efficient, and with this they dragged the bottom of the sea, and caught the branches of the red coral. Having brought them to the surface by this entangled structure, they left them to putrefy or get rid of the animal matter. The red coral was the skeleton that was left. In the case of white coral, the skeleton was more complete. In the red coral the skeleton belonged to the whole; in the white there was a special skeleton for every polyp. Some of the white coral assumed great size, and the activity of these animals in separating the carbonate of lime from the sea, and building it up into definite shape, was a very considerable thing indeed. He thought he had now said as much as he could, without taking them into technical details, of the general nature of those creatures forming coral. The coral polyp was scattered over the seas of all the countries of the world. The red coral was not so. It was comparatively limited, but the white coral polyp was far more widely scattered. There were certain parts of the world where the coral living there was of a kind remaining adherent together, and forming a great mass. It differed from the ordinary polyp just in the same way as plants forming peat and bog or turf differed from ordinary plants. They had a habit of growing together in masses in the same place. They were what were called gregarious things, they died and left their skeleton. These skeletons formed considerable and solid aggregations at the bottom of the sea. Other polypes perched upon them, and began to build for themselves, so that by degrees a great mass was formed, just as we knew there were ancient cities, on which they had an ancient British city, over that the foundation of a Roman city, over that a Saxon city, and over that again a modern city. So in these localities of which he was speaking, they had an accumulation of the foundations which would, in course of time, rise to the surface of the sea. The outward or sea face of the coral was covered with living forms, which grew less numerous as the depth increased, until a point was reached where there was no coral life. Very extensive observation showed that these living, building corals could not live in a greater depth of water than 120 ft. or 150 ft. Gradually there grew up a circling wall of coral, enclosing a lake of smooth water, and on the margin of these reefs, after they appeared above the water, vegetation rapidly sprang. The appearance of these verdure-clad reefs, with the blue sea and the white breakers outside, and a lake of green water inside, was exceedingly picturesque, particularly when they were crammed with cocoanut trees. These pyramids, built up from the bottom of the sea, dwarfed into insignificance anything that human hands had ever built up. In one case, a barrier reef near the Australian coast extended for, perhaps, 1,000 miles, and varied in width from two to three miles, while its depth might be measured by thousands of feet.

Since, however, it was ascertained that coral animals could never have lived at these depths, in order to form the reefs, it became very puzzling to know how the structure had been erected. The discoverer of this problem was Mr. DARWIN, who, by one of the most signal instances of the astonishing sagacity he possessed in drawing necessary consequences by way of induction from ascertained phenomena, which had served him in such good stead on other occasions, settled the whole question. Mr. DARWIN said to himself, it is perfectly clear that the coral which forms the basis of these reefs could not possibly have been formed at their present level. From the position one of two things followed, either the sea had gone up or the land had gone down. The objections to the notion of the sea having gone up were very considerable, for it would readily be perceived that the sea could not possibly have gone up, for if it had gone up 1,000 feet in the Pacific, it must have gone up pretty much the same distance everywhere else, and if it had the geography of the world in general would be very different from what it is now. (Laughter.) The only other alternative was to suppose that the land had gone down, and that it had gone down at so slow a rate that the corals were able to grow upward as fast as the reef on which they grew went downward. This was not sufficient for the student of Nature—which was most probably spoken of as feminine on account of the astonishing tricks which she played off on her admirers; but all the cross proofs—as, for example, the observations of volcanic action in the Pacific—bore out the theory. These reefs were timekeepers of a very important character. In his computation of the rates at which corals grew, he would make allowance on the side of excess. Anybody who knew anything about the matter would tell them that he made a computation far in excess of what was probable if he said that an inch of coral limestone would be added to one of these reefs in the course of the year. Most naturalists would be inclined to laugh at any such assumption, and probably they would put the amount at certainly not more than half that amount. But, supposing the rate was an inch a year, what a very curious notion of the antiquity of some of these great living reefs was suggested. There was no doubt whatever that the sea faces of some of them were fully 1,000 feet high. Reckoning at an inch a year, this would require a period of 12,000 years for the structure of this pyramid of coral limestone, and during that period these corals must have been laboring in conditions substantially the same as they are now, otherwise they could not have continued their work. He thought, however, that without exaggerating the actual rate of growth, they might safely double the period he had named as the time during which, in the Pacific Ocean, the general state of the climate and the general temperatnre had been substantially the same as it now was. And the state of things which now existed in the Pacific was but the yesterday of the life of the globe. These pyramids of coral rock which he had described were built upon a foundation which, so to speak, was of yesterday, and which had been formed by the last superficial deposits with which the geologist has to deal. And if they went back in time, searching through other series of rocks, they would find at every stage of the world's history great columns of limestone which had certainly been built up in just the same way as these coral reefs which were now forming at the bottom of the Pacific. Everywhere the order of things was consistent with a period of duration of which our ordinary standards of chronology could give us not the slightest conception. In other words, the history of these coral reefs, like everything else he knew, testified to the prodigious antiquity of the earth since it existed in a condition in the main similar to that in which it now is. (Cheers.)—*Colliery Guardian.*

The British Association.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

On the Temperature of the Air at four feet, twenty-two feet, and fifty feet high.—J. GLAISHER, F.R.S. In his opening remarks, Mr. GLAISHER spoke of the erroneous opinions which were entertained previous to his balloons ascent with regard to temperature at different heights; it was supposed that the temperature of the air always decreased from the earth upwards, and followed some constant law; this was, however, found not to be the case; and in the Report to the British Association at Nottingham, in 1866, the conclusions were, "that the law of decrease of temperature with increase of elevation was variable throughout the day, and also in different seasons of the year; that at about sunset the temperature was sensibly the same up to 2,000 feet; and that at night (conjectures from the results of the obsevation taken in the only two night ascents) the temperature of the air increased from the earth upwards." It was therefore evident that a very large number of ascents would have to be made to determine the real laws.

Fortunately, in the second year of the balloon experiments, he placed a dry and wet bulb thermometer at the height of twenty-two feet above the ground, readings of which have been taken four times daily, viz., at nine P. M., noon, three A. M., and at nine P. M. Although from these observations, and also from those made at the different ascents, it was known that sometimes readings at the higher point were above those at four feet from the ground, no particular attention was paid to the above readings until after the results of the observations made in M. GIFFARD'S Captive balloon were known; these, however, were of such importance, proving that "the decrease of temperature with increase of elevation had a diurnal range, and was different hours of the day, the change being greatest and mid-day, and least at or about sunset (see Report to the B. A. for 1869 at Exeter), and that sensible changes occurred within thirty feet of the earth," that Mr. GLAISHER caused the observations taken at the height of twenty-two feet to be reduced; collecting the observations recorded during the period 1867–1870, the differences between the readings of the two thermometers were taken, and affixing the sign *plus* (+) to the difference when the temperature at the high elevation exceeded that at the lower, and the sign *minus* (—) when *vice versa*.

On taking the monthly means of the differences, it was proved that the *mean temperature* of the air at twenty-two feet high differs from that at four feet by :—

	9 A. M. deg.	Noon deg.	3 P. M. deg.	9 P. M. deg.
In January,	+ 0.5	+ 0.2	+ 0.4	+ 0 6
In February,	+ 0.2	0.0	+ 0.4	+ 0.5
In March,	— 0·3	— 0.2	0.0	+ 0.4
In April,	— 0.6	— 0.5	+ 0.2	+ 0 5
In May,	— 0.6	— 0.4	— 0.4	+ 0.5
In June,	— 0.8	— 0.9	— 0.6	+ 0.8
In July,	— 0.8	— 0.8	— 0.8	+ 0.7
In August,	— 1.0	— 0.5	— 0.1	+ 0.9
In September,	— 1.0	— 0.6	0.0	+ 0.7
In October,	— 2.2	— 0.1	+ 0.6	+ 1.0
In November,	+ 0.2	+ 0.1	+ 0.6	+ 0 8
In December,	+ 0.5	+ 0.3	+ 0.4	+ 0.4

Therefore the monthly mean temperature of the air at twenty-two feet was higher than at four feet, at all hours of the day and night, in January, February, November, and December; in the afternoon and during the night hours in the months of March, April, August, September, and October; in the evening hours and during the night, in the months of May, June, and July; and that the results in one year agreed very closely with those in the same moths in other years.

By selecting the largest number with a + sign, and the largest with a — sign in each month, it was found that in the winter months the temperature at twenty-two feet high ranged from 2° to 4° above, and from 1° to 2° below that at four feet, and in the summer months from 4° to 5° above and from 4° to 5° below that at four feet high.

The ratio of — readings to + was, in January and February as 1 to 5 at all hours. In March, April, August, and September, during the day, one of equality. In May, June, and July, as 3 to 2 during the day hours. In October, as 1 to 4; in November, 1 to 7; and in December, as 1 to 10. At the hour of nine P. M. throughout the year, it was 1 to 7.

Thus the — sign preponderates, indicating lower temperature above, during the day hours, in the months of May, June, and July; the two signs are about equal in number in the months of March, April, August, and September, and the + sign preponderates, denoting higher temperature during the day and night, in January, February, October, November. and December, and during the night throughout the whole year.

A second thermometer, carefully protected from radiation, was placed in the middle of the year 1869 at the height of 50 feet and since then its readings have been regularly taken.

The *mean monthly temperature* of the air at 50 feet high was found to differ from that on the ground as follows :—

1869	9. A. M. deg.	Noon. deg.	3. P. M. deg.	9 P. M. deg.
In October,	+ 0.2	— 0.5	+ 0.7	+ 0.5
In November,	+ 0.6	+ 0.5	+ 0.8	+ 0.4
In December,	+ 0.9	+ 0.3	+ 0.5	+ 0.5
1870.				
In January,	+ 1.1	+ 0.3	+ 0.7	+ 0.9
In February,	+ 0.1	— 0.3	+ 0.3	+ 0.5
In March,	— 0.3	— 1.8	— 0.7	+ 0.7
In April,	+ 0.9	+ 2 2	+ 1.7	+ 1.4
In May,	— 2.4	— 3.6	— 2.8	+ 1.1
In June,	— 2.4	— 3.8	— 3.1	+ 1.1
In July,	— 1.8	— 2.9	— 2.8	+ 1.1
In August,	— 1.7	— 2.7	— 2.0	+ 1.7

Thus we have the unexpected results that the *mean monthly temperature* of the air at 22 feet and at 50 feet high is higher during the evening and night hours throughout the year than at the height of 4 feet, and also higher night and day during the winter months.

In conducting the above investigation, it was known that the clouds had great influence on the temperature; Mr. GLAISHER therefore selected those days with a sky covered with dense clouds, and it was found that there was on such days no difference between the temperature at the heights of 4, 22, and 50 feet. At the height of 50 feet, in the summer months, the temperature during the day was frequently 6° or 7° lower, and at night 5° or 6° higher than at 4 feet.—*Nature.*

THE ENGINEERING AND MINING JOURNAL.

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WESTERN & COMPANY,
Publishers,
37 PARK ROW,
NEW YORK CITY.

P. O. Box, 5969.

Senator Stewart's New Bill.

WE publish in another column the text of a bill introduced on the 9th instant by Senator STEWART of Nevada, "to define and protect the rights of miners, and to encourage the development of mines." The bill has been referred to the committee of which the distinguished author is chairman; and he writes us that it will be considerably modified before it is reported to the Senate. In its present form, therefore, we may regard it as merely the rough first draft of a much-needed statute; and our criticisms upon it are intended as suggestions, contributed to that discussion which will result, we trust, in a perfect law.

The present mining law of the United States, as we have often pointed out in this journal, is fatally ambiguous on a very important point. It does not clearly declare whether the surface granted by patent to the owner of a lode within it, is or is not his property in fee simple. Commissioner RAYMOND holds, (and, we think, rightly) that the only fair construction of the law is that it absolutely grants so many acres of land to the patentee, *plus* the right to work a certain lode within the tract, following the mineral in depth, even into adjoining tracts. But this theory leaves an embarrassing question as to other lodes within the tract. The law positively declares that there shall be but one lode included in the survey; which is a piece of *ex post facto* legislation ridiculous enough. Nature wouldn't obey it if she could; and she couldn't if she would; since the lodes are there already. All that can be done is to see that only one already discovered outcrop is included; and even this is a vexatious and unnecessary provision. As for those which happen to be discovered after the issue of the patent, the patentee is apparently debarred from working them, and no one else can touch them without trespass, if the patent really grants the ownership of the surface tract. This point was distinctly charged in several cases in Nevada, last year, where the Judge held that the language, both of the Act and the patent, is that of an absolute grant.

On the other hand, it has been held by courts of the same State, that the United States patent does no more than confirm the previous possessory title, bestowing upon the locator an unconditional right to his claim on the vein, and an easement only on the surface—that is, a right to use a certain area, if necessary for mining purposes. According to this theory, patents may overlap one another; town-sites may be located and owned on patented ground; and patentees have no surface rights which squatters, prospectors and pirates are bound to respect. Either of the two theories is embarrassing; but the latter is far more objectionable in results, as well as less reasonable in foundation, than the former.

The first object of Senator STEWART'S new bill is evidently to correct this evil, by declaring distinctly the ownership of the surface-location, together with all included veins, to be vested in the locator. This is just and wise. It is what we have ourselves urged; and it is admirably discussed and advocated in the letters of Judge DUNNE to the Commissioner of Mining Statistics, published in our columns last year.

The second object of this bill, as will be seen upon its perusal, is to legalize the location of timber and pasture tracts, mill-sites, etc., in connection with mines upon the public lands. This is a practice which has grown up without explicit authority of law in many of our interior districts. It is founded in necessity. The rigid enforcement of the law as it now stands, with regard to the timber on unsurveyed public lands, would almost put a stop to mining operations throughout several States and Territories. We have not closely examined the provisions with which this part of the proposed measure is guarded; but we have no doubt that, under proper restrictions, the protection of the law should be extended over this essential auxiliary part of mining industry, as much as over the immediate operations of extracting and reducing ore.

So much for the general features of the bill, which are progressive and judicious. One or two objections to its details, however, seem worthy of mention.

First of all, we confess that we would rather see the various Acts affecting our mining industry combined, harmonized, amended and codified than tinkered by new enactments, to be muddily construed by the Land Office at Washington, its numerous officials throughout the country, and, worst of all, by ignorant and corrupt juries in the mining districts. There is confusion enough already; and interested or prejudiced persons take advantage of it to defeat the ends of justice.

The first section of the bill before us contains two provisions to which we object. One of them is probably an over-sight; the other is copied from the worst feature of the existing law. The former is the declaration that "the locators * * *shall be the owners*," etc. The effect of this unqualified phrase, it seems to us, is to abolish the whole system of mining patents, and make the possessory title as good as any that can be given by the United States. That this sweeping measure is not intended, appears from a proviso in the second section, where the continuance of the present patent system is clearly contemplated. Certainly what the government desires is to induce miners to buy their mines. Force them to buy, it cannot; prevent them from mining unless they buy, it ought not and will not; the wisest and least objectionable course is to say to them: "You have the privilege of mining freely on the public ands; but you have no rights of ownership, until you apply for a patent. You can work; but you cannot stop working and retain a right to prevent other citizens from occupying your abandoned claims."

Doubtless Senator STEWART intends that the ownership of surface conferred by this section upon locators should be of the same kind as that ownership which they have in their veins—namely, possessory only, and altogether dependent upon the local regulations of the district. But this intention is not so clearly expressed as we wish it were; and, moreover, it is rendered futile by the final proviso of the section, namely, "That the manner of locating claims, the size thereof, the rules by which their boundaries shall be determined, and the work required to be done thereon, shall remain subject to the rules and regulations of each mining district, not in conflict with any law of the United States."

One of these particulars, and one only—that of size—is regulated by United States law. All the rest are now left to the local regulations; and the result throughout the West is wide confusion, outrage, injustice and absurdity. This bill prescribes that the width of a location shall not exceed three hundred feet on each side of the middle of the vein. We think two hundred and fifty would be enough; but that is a small matter. A very great matter indeed is the silence of the bill on other points. It is high time that the United States should insist on decent regulations in the mining districts.

The records of location should be made in such a way that the property can be found again. At present there is often nothing on the record but a date and a name. The essential point—identification of the lode—is dependent on the evidence of those who choose to "recognize," out of a thousand holes in the ground, the particular one which bears, or once bore, the name on the record.

Records should be kept in suitable books, in suitable buildings and under the care of responsible officers. At present, the titles to property worth millions of dollars are to be found in loose sheets, pocket-books, greasy, singed, torn and illegible old ledgers, or what not, kicking about miners' cabins, groceries or bar-rooms. The recorders are not responsible, except to Judge LYNCH; and he only interferes when his friends are wronged. For the Eastern or foreign capitalist there is too frequently neither security nor justice.

Again, and above all, the conditions on which a possessory claim is held ought not to be left entirely to the inhabitants of a mining district. The proposition is laughable, when one considers what it involves. The individuals who claim something that belongs to the people of the United States are to fix the conditions on which the United States shall recognize their claim! No wonder that the local regulations of new districts are so drawn as to favor the worst kind of speculation—speculation without capital. Thousands of feet of mining claims are seized and held for sale, without being worked, and honest industry is thus strangled in its cradle.

We hold that the mineral deposits on the public lands are the property of all the people of this country; that the people, with wise liberality, have declared them free to the miner; and that any man who claims to own a mine which he has only bought and is not working, is interfering with that freedom of mining which the people have decreed.

But it will be said that many of our mining districts have properly regulated these matters already, providing for due safety of titles, and requiring a certain amount of work to maintain the ownership of claims. This is true; and what we demand is that all the districts shall do what these have done. The citizens of the United States or the capitalists of Europe, investing money in our mines, should be as much protected in one county or district as in another. What do they know of the differences of local regulations, which do not exist in any law-book or official record whatever, and which may be changed at any time by a mass-meeting of interested parties?

But it may be said, further, that no universal rule could be devised to cover the points named. This we doubt. If it is true at all, it is true with regard to the amount of work required to hold a claim. The amount which would seem reasonable in one district might, it is said, prove burdensome in another. We think an amount could be fixed which would be little more than nominal; and the alternative of paying a small sum in lieu of the work would relieve the case from possible hardship. It is not the amount of work or money; it is the vigorous requirement of *something*, that we consider necessary. Let the United States at least declare that a claim is forfeited by abandonment for one year. This was declared, some two or three years ago, on grounds of common sense and public policy by Judge BEATTY at Austin, Nevada; and we hailed that decision as profoundly wise and immensely important. But the Supreme Court of Nevada has since reversed it; and the rights of the United States and of enterprising industry are again at the mercy of black-mailers, quartz-pirates and wild-cat operators.

The country looks to Senator STEWART to complete the work he has begun. Identified for years with the mining industry, thoroughly qualified by eminent legal ability and long practical experience in mining law, he has distinguished himself as the enlightened and earnest advocate of all measures calculated to protect, encourage and educate the American miner. Under his leadership, we have advanced from a state of utter lawlessness to the frontiers of order and stable justice. Let him remove for us now the relics of barbarism that still remain. He will add a crowning laurel to his fame, in bestowing upon every part of our wide domain at once the stimulus of freedom and the guaranty of law.

Scientific Lectures.

THE Trustees of the American Institute present the following interesting programme of Scientific Lectures, to be delivered at the Academy of Music this winter:

I. Tuesday evening, December 20, 1870, "The Struggles of Science," by GEORGE B. LORING, M. D., of Salem, Mass.

II. Tuesday evening, December 27th, 1870, "How we Stand and Walk," by Prof. BURT G. WILDER, of Cornell University, Ithaca, N. Y.

III. Friday evening, January 6th, 1871, "The Triumphs of Modern Surgery," by Prof. F. H. HAMILTON, of Bellevue Hospital Medical College, New York.

IV. Friday evening, January 20th, 1871, "On Water," by Prof. C. F. CHANDLER, of Columbia College, New York.

V. Friday evening, January 27th, 1871, "On Tides and Tidal Currents, and their Effects upon Harbors," by J. E. HILGARD, of the U. S. Coast Survey, Washington, D. C.

VI. Friday evening, February 3d, 1871, "On Light," by HENRY MORTON, President of Stevens Institute, Hoboken, N. J.

Tickets, fifty cents each.

Mint Reform.

THE bill prepared by Hon. JOHN JAY KNOX and other experts, codifying the mint laws of the United States and establishing a bureau in the Treasury for their administration, will probably come before Congress at its present session. We hope that its essential features will not suffer at the hands of committees or amateur amenders, and that it will become a law. The reduction or abolition of the coinage charge is a very important and much needed reform. The purchase of refined bullion by the mint we are also inclined to favor, though on that point there is room to doubt. But the bill as a whole is carefully and wisely drawn, and the numerous opinions of scientific men, recently transmitted to Congress and published, show a considerable unanimity in its favor, always excepting the dignified opposition of the Philadelphia Director, who is nominally at the head of all the mints, and wishes to preserve the honors he enjoys. This opposition was to be expected; but it should not defeat a reform so much to be desired.

The Treasury Report—A Telegraphic Error.

In the report of the Secretary of the Treasury, as published by the New York daily papers, there is but a single brief sentence concerning the collection of mining statistics, followed by an abrupt statement that "the continuance of the *war* appears to be a matter of national importance." The introduction by the newspapers of a sub-title "*Effects of the War on American Commerce*," makes this transition still more marked. The official copy, just received, says the continuance of the *work* is important; referring to the work of collecting mining statistics, to which allusion has just been made. There is nothing in the context about the foreign war. The error is insignificant, except so far as it withdraws the Secretary's recommendation which he desires to encourage, and which Congress has hitherto cordially supported.

Improved Method of Manufacturing Pig Iron in Scotland.

DURING the last year or two the ingenuity of the Scotch ironmasters has been exercised devising some plan by which they might more effectually cope with Middlesborough in the manufacture of pig-iron. A few months ago Mr. RICHARD BROWN, of the Shotts Iron Company, suggested the propriety of taking the ironstone hot from the kiln, after having been roasted, and placing it in the smelting furnace, in order to preserve the caloric at the roasting point, and so save the fuel which was necessary to bring it up to that point, after having allowed it to cool down to the temperature of the atmosphere; or, as was too frequently the case, bringing it up to the temperature of the roasting heat, after its exposure to the atmospheric influences for, perhaps, ten or twenty years. THE process was tried and found economic, the drawback being the distance, in too many instances, of the roasting pits from the smelting furnaces. Since that time science has been questioned and d-

led, and experimented with, for the purpose of assisting our smelters in the production of their iron, and two plans are at present being experimented with—one at the works of Messrs. MERRY & CUNNINGHAME, Ayrshire, and the other at Calderbank, in Lanarkshire. Of the two methods, the one seems to us to be the perfection of the other, as in some of the leading features, we have been informed, they are identical. Of the one most matured we give the following description, merely premising that while the process is regarded as a success, the details following may not ultimately be all required: Through the kindness of Mr. FERRIE, the manager for the trustees of the Monkland Iron and Steel Company, an opportunity was afforded for examining a new furnace which has been erected in order to give a fair trial to a patent recently taken out by him for an improvement in the manufacture of pig-iron. The furnace in its construction has been much heightened, and is eighty-three feet high. The top is completely closed, not an atom of smoke or flame escaping, and it is covered by a bell and cone divided into four slanting compartments, into which the raw materials are put, the bell and cone being lifted and lowered by a small engine situated on the top of the furnace. When the bell is lifted the minerals fall down the cone into four separate arched divisions, partially separated from the rest of the furnace, and which are heated up to 1500° by part of the gas (carbonic oxide) emitted from the top, which is brought down by a flue, gradually converting the coal into coke. Before passing down into the furnace the other minerals received the same heat. Another flue conducts the rest of the gas down to the hot-blast heaters, and from this single furnace enough gas is generated to fire all the heaters for the six furnaces now in blast at Calderbank. When Mr. FERRIE gets another furnace into operation he will not only be able to heat it in addition, but it will also fire all the boilers connected with the blast engines. The great advantage of this plan over the Middlesborough system is that, by collecting the gas off the raw coal whilst undergoing the process of coking in the retorts (the great point in the patent), double the quantity is obtained, whereas at the above-named place, where the coal is all coked before being put into the furnace, the quantity is very much less. Although the furnace has only been a short time in operation, Mr. FERRIE is saving just now 15 cwts. of coal to the ton of pig, and expects to save a ton, by means of the heat applied to the furnace by the gases in the coking process, besides the dross and labor at the heaters; thus making the reduction in the cost of production—(say) one ton of coal, 5s. 6d.; dross and labor, 2s.—7s. 6d. Under this patent a saving of dross and labor may be obtained on each of the other old-fashioned furnaces of 1s. per ton; and when the blast-engine boilers are heated with gas there will be a further reduction of 1s. to 1s. 6d. per ton on the furnaces which are not yet on the patent principle. We may mention that, from all appearances, this furnace will yield a third more than an ordinary one.

The cost of building a furnace suitable for working Mr. FERRIE's patent is estimated at £3,500, and the expense of altering one of those in present use is calculated to be £700. Should the apparent promise of this patent be realized, Scottish iron-masters will be largely benefitted by the result.

Remarkable Gas Wells in Ohio.

By J. S. NEWBERRY.

IN June, 1866, I visited two remarkable gas wells bored by Mr. PETER NEFF, in the valley of the Kokosing, a few miles east of Gambier (where Kenyon College is located) in Knox county, Ohio; I wrote a description of them, which was published in the Cleveland *Herald*. As gas wells are just now attracting some attention as sources of supply of gas for illumination and fuel, I have thought it might not be uninteresting to your readers to have this description repeated for their benefit.

It will probably add to the interest with which it will be read, to say that the wells described below have been flowing gas in apparently undiminished volume to the present time.

From Gambier our route lay down the valley of Kokosing some twenty miles to the junction of that stream with the Walholding. Within this interval the valley has nearly an east and west course, and is excavated in the "Waverley" (lower carboniferous) formation, in the direction of the dip of the strata, which is here eastwardly, about twenty-two feet to the mile. Near Millwood, however, a few miles below Gambier, we crossed a belt of a mile or more in width, in which the rocks are much disturbed, the dip being increased to 30° with the horizon. Such disturbances are hopeful signs in an oil region, as they indicate the existence of subterranean fissures and cavities in which the oil may accumulate, and without which no great oil wells are possible. Two wells have been bored near this break, one above, the other below. These are flowing, one three, the other eight gallons of oil per day, and are soon to be thoroughly tested by the pump. Two or three miles below, and near the mouth of the Kokosing, two other wells have been bored to the depth of 600 feet, penetrating argillaceous shale with bands of sandstone. On reaching the third sand rock, at the depth of 600 feet, the auger, in both wells, struck upon nearly vertical crevices, into which it penetrated several feet without resistance. From these crevices issued a volume of carburetted hydrogen gas without parallel, so far as I am informed, in all the oil explorations made in the country.

In both wells copious streams of salt water had been previously met with, and the wells were filled when the gas chambers were struck, but this water was ejected with such violence as to form intermittent fountains over one hundred feet in height. The first of these two wells was bored during the winter, and the water thrown out soon covered the derrick with ice, forming a kind of chimney sixty feet in height. Through this the water was thrown, at intervals of about one minute, to double that height, or 120 feet. After, and with the water, came a great rush of gas, which continued until the pressure was relieved, when the water began to accumulate and was again ejected. This series of phenomena has been repeated with unvarying regularity and undiminished force for some months.

At the time of my visit an effort was being made to tube the well, by which the flow of water and gas was somewhat impeded, and I did not witness the full effect of the paroxysm, but a series of photographs which I saw fully confirmed the description given me by Professor H. S. SMITH and others.

When the derrick was covered with ice the gas escaping from the well was frequently ignited, and the effect, especially at night, of this fountain of mingled fire and water shooting up to the height of 120 feet, through a great transparent and illuminated chimney, is said to have been indescribably magnificent.

In well No. 2, which has a history similar to that of No. 1, the gas chamber was opened on the 1st of March, but this well has been carefully cased and the water all shut off, so that the gas is permitted to escape without impediment. A pipe two inches in the clear is set in the well-head, and from this a constant stream of illuminating gas is now, and for three months has been, escaping with a sound audible some distance from the well.

At the time of our visit nearly 100 feet of pipe was connected with the well, and thus, at a safe distance, the gas issuing from it was ignited. The effect, even in bright sunshine, was surprising. A jet of flame was formed twenty feet or more in length, and as large as a hogshead. By fixing a stop-cock on the pipe, the gas was made to accumulate until, measured by a steam-gauge, the pressure amounted to 180 pounds to the square inch.

This was as great a pressure as the gauge would indicate, but it is evident that the pressure below is much greater than that, as the weight of the column of water, 600 feet high, lifted by it is 262 pounds to the square inch. When liberated after confinement of a few minutes, and ignited, the gas formed a volume of flame as large as a house. At night an exhibition similar to that witnessed by us at mid-day is said to be wonderfully impressive, the gas illuminating the whole country like a conflagration.

The gas from these wells seems to be pure, having no other smell than an agreeable one of naphtha, and has high illuminating qualities. Its volume is sufficient to light a large city, and, if differently situated, the value of the material thus wasted, for lighting or heating, would be greater than the product of the best oil well known.—*American Chemist.*

Notes on the Hunt and Douglas New Process for the Extraction of Copper from its Ores.

By DR. T. STERRY HUNT, F. R. S.

THE peculiarity of the HUNT and DOUGLAS process is in the solvent used to remove the oxide of copper from the naturally or artificially oxidized ore. Others use sulphuric or hydrochloric acids, but these require special conditions for the preparations of the acid, which in many places cannot be commanded. Others still use perchloride of iron, which readily dissolves oxide of copper, but also requires special appliances for its production. All of these methods, moreover, give the whole of the copper in solution as protochloride, which requires, for its precipitation, a full equivalent of metallic iron; and always furnish solutions holding an excess of persalts of iron, which themselves also consume a great deal of metallic iron; at the same time giving rise to insoluble basic persalts of iron, which contaminate the cement copper; so that to precipitate a ton of cement copper by the moist processes hitherto used, from 1½ to 2½ tons of metallic iron are consumed, and the resulting precipitated copper is, at the same time, always very impure.

The other methods of rendering copper soluble, now employed, are roasting with salt, as in LONGMAID and HENDERSON'S process; or with sulphate of soda, as in MONNIER'S process.

Where, as in England, salt can be got very cheaply, the 10-15 per cent. of salt required to treat a 5 or 6 per cent. ore is of little account; but even then HENDERSON finds it necessary to supplement the action of the salt by a portion of hydrochloric acid after roasting; thus involving, though in a less degree, all the objections urged against the use of acids alone.

If it be desired to recover the salt or sulphate of soda from the mother-liquors, previously deprived of their copper, the cost of fuel is very great, amounting, for a 6 per cent. ore, by the MONNIER process, to ten cords of wood against seven cords employed in roasting the ore. Hence, this theoretically beautiful process involves a great expenditure of fuel for the recovery of sulphate of soda from the mother-liquors, after the copper has been completely thrown down.

The process of HUNT and DOUGLAS depends upon certain reactions which have been studied and described by the writer in the *American Journal of Science* for March last. Protochloride of iron readily attacks protoxide of copper, the iron being thrown down as peroxide, and the copper converted into a mixture of protochloride and dichloride—the latter of which, though insoluble in water, is readily soluble in strong solutions of common salt. The resulting solution from protoxide of copper holds, combined with two equivalents of chlorine, three equivalents of copper, which are thrown down, in the metallic state, by two equivalents of metallic iron; regenerating thus the protochloride of iron, which is ready to dissolve a second portion of oxide of copper as before. In this way, all persalts of iron being avoided, a ton of cement copper is thrown down by about two-thirds of a ton of metallic iron, and the contamination of basic persalt of iron in the cement does not occur.

The precipitation and the solution are both so rapid when hot solutions are employed, that the same bath may be used once every twenty-four hours; and by certain precautions, maintains its strength indefinitely. These consist in the use, in some cases, of small quantities of lime, to prevent the accumulation of sulphate of iron in the bath; and, in others, of a little sulphurous acid, to prevent a diminution in the quantity of protosalt of iron when oxidized ores, holding little or no sulphate of copper, are treated.

Hence, after the preparation of the baths there is no consumption of salt, except to supply inevitable waste, and no fuel save that required to roast the ores and maintain the temperature of the baths.

This process, as pointed out by its inventors, possesses this advantage over those in which the copper is dissolved as sulphate, that whereas the sulphate of copper has no power of taking unoxidized copper into solution, liquids holding a mixture of protochloride of copper and common salt, rapidly attack and dissolve, not only metallic copper, but also sulphides, such as copper regulus, with the formation of dichloride of copper; so that the deficiencies in the roasting process are supplied by the bath. This same power, as they have also pointed out, enables the bath, when charged with copper, to chlorodize and dissolve silver, as in the Spanish *patio* process; so that, in the case of an argentiferous copper ore, the whole of the precious metal passes into solution with the copper, and may be precipitated in the metallic state. They have, therefore proposed to apply this process to the treatment of the argentiferous copper mattes from Colorado.

The following extracts from a second edition of the little pamphlet recently published by Messrs. HUNT and DOUGLAS, will suffice to give a further notion of the process, and the mode of working now pursued by them near Quebec:

WORKING RESULTS OF THE PROCESS.—The new method above described is now in use at the Harvey Hill mine in Leeds, near Quebec. The ores there treated are a mixture of yellow and purple sulphurets of copper, dressed for the purpose to 15 or 20 per cent., and ground so as to pass through a sieve of forty meshes to the linear inch. The roasting is at present effected on a small scale in a muffle furnace thirty feet long, with a wood fire, the heat passing in flues beneath the floor of the muffle only. With this arrangement, however, only about two tons of ore can be roasted in twenty-four hours, and it is proposed to erect at once larger and more convenient furnaces. A proper arrangement for roasting, though an indispensable preliminary to the treatment of sulphuretted ores, constitutes no distinctive part of the new process, which has for its object the solution and precipitation of copper from naturally or artificially oxidized ores.

SOLUTION.—A Freiberg barrel was used in the earlier trials, but has since been advantageously replaced by two circular tubs, made of three-inch spruce plank, measuring seven feet in diameter by five feet in height, and furnished with closely-fitting covers. The stirring apparatus consists of two oblique blades fastened to a vertical shaft, their ends being within an inch of the sides, and about twelve inches from the bottom of the tub, which is somewhat convex, so as to diminish the space beneath the revolving blades near the centre, and thus prevent an accumulation of ore in that part. Such a tub will hold about five tons of liquid, and may be three-quarters filled. With twenty or twenty-five turns of the stirrer in a minute, it is easy to keep one and a half or even two tons of roasted ore suspended in three tons of liquid, and if allowed to subside the ore falls so as to leave the stirrer free. The bath used at present is even weaker than that indicated in the foregoing specification, making about 19° Baumé (specific gravity, 1·147), and containing ten grains of iron to the fluid ounce, or a little over two per cent. Such a bath will, by continued agitation, at a temperature of 120° to 180° Fahr. dissolve the oxide of copper from a properly roasted ore holding 15 per cent. in six or eight hours. At the end of this time a sample of the washed gangue should not yield to strong boiling acetic acid more than two or three thousandths of copper. Should boiling nitric acid remove a further portion, it shows a defective roasting of the ore. The stirrer being stopped, the liquid is quickly drawn off through an opening near the bottom by a two-inch India-rubber hose into a large covered settling-tank, where it deposits the finely divided portions of the gangue and the suspended peroxide of iron. The gangue is washed by agitating for a few minutes with a portion of fresh bath or of brine, in order to remove the copper solution which it retains, and is then shoveled out through a trap eight inches square in the bottom of the tank.

PRECIPITATION.—After three or four hours' repose in the settling tank, the clear copper solution is drawn off to the precipitating tanks, which are built like the dissolving-tanks, but with flat bottoms. Here scrap irons, either of wrought or cast metal, is placed on racks of basket-work near the top and bottom of the tank, which is filled with hot liquor, and closely covered. After twelve hours, if the exposed surface of iron be sufficient, the precipitation of the copper is very nearly complete, and the liquid may be drawn off, passing through a flannel filter to retain any suspended particles of metallic copper, and is ready to be transferred to the dissolving-tank for the treatment of a fresh charge of roasted ore. A little steam injected from time to time either into the dissolving or precipitating-tank suffices to keep the bath at about 15° F., at which temperature tde process of solution and precipitation proceed with rapidity. As a charge of bath can be used once every twenty-four hours, the loss of heat in covered vessels is slight. The vats for the three operations are arranged at different levels, so that the liquors flow from the dissolving to the subsiding, and thence to the precipitating tanks. As both iron and copper are attacked by the copper solutions, the use of these metals must be avoided in those parts of the apparatus which are exposed to its action.

The use of lime and of sulphurous acid in this process has been already explained. The ores used at Harvey Hill are, however, so calcareous, that lime is not needed to decompose the sulphate of copper formed in roasting. A small amount of sulphurous gas, from the roasting of the ore, is made to pass over the surface of the bath, through a tube entering one side of the closely-covered dissolving-tank, while from the other side an escape tube passes into a chimney, thus establishing a draught. In this way it has been easy at Harvey Hill to keep up, and even to augment at will the iron contents of the bath. If this becomes excessive, its amount is readily reduced by adding a little lime, or, in the case of the calcareous ores now used, by running one or more charges without the use of sulphurous acid. Baths which have been used twelve and fifteen times at Harvey Hill, at each time taking up and precipitating two or three per cent. of copper, are unaltered in their composition, and as good as at first. The consumption of metallic iron in precipitating, as determined by numerous trials on solutions prepared as above, and holding from fifty to sixty pounds of

copper to the ton, will not exceed fourteen hundred pounds of iron to the ton of pure copper thrown down.

The cost of working copper ores by this process are comprehended under four heads :

1. The roasting and grinding of the ores, and the furnaces and mills for the purpose. Poor ores may be kiln-roasted before grinding, but rich ores and regulus should be pulverized before roasting.

2. The necessary vats and stirring apparatus, and the handling of the materials in dissolving and precipitating.

3. The first cost of the baths and the small amount of salt required to supply unavoidable waste, besides, in some cases only, a portion of lime.

4. The metallic iron required for precipitating the copper, which is not more than one-half to one-third the amount consumed in the ordinary processes for obtaining cement copper.

TREATMENT OF COPPER ORES HOLDING SILVER AND GOLD.—The bath of protochloride of iron and common salt, after being more or less completely saturated with copper, chloridizes and dissolves silver or any of its compounds, in virtue of the well-known action of protochloride of copper. Repeated experiments with the silver and gold-bearing sulphuretted copper ores of Colorado and other regions, have shown that when a properly roasted ore of this kind (or a regulus from such ore) is treated in the way just described for the removal of its copper, all of the silver is, at the same time, dissolved as a chloride in the bath, and may be thrown down in the metallic state by digesting it with metallic copper, or causing it to filter through a bed of cement copper. After thus separating the silver, the copper is precipitated as usual by metallic iron, The residue from the bath, having lost its copper and silver, contains any gold which may have been present in the ore, in a favorable condition for removal by chlorination. Trials on a considerable scale have shown that when a regulus, holding at the same time copper, silver and gold, is treated by the present process for the extraction of the copper, it is possible, with but little additional expense, to separate from it at the same time all the silver and gold. The removal of the silver from the bath requires only the use of a portion of the cement copper from a previous operation, while to obtain the gold from the residues the ordinary apparatus for chlorination may be employed.

In the case of copper ores containing nickel, this metal gradually accumulates in the bath, and when in sufficient quantity may be extracted, after first peroxidizing and precipitating the iron, which would probably be best effected by forcing a current of air through the liquid, previously mingled with pulverized carbonate of lime.—*The American Chemist.*

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109,993.—CARRIAGE-SPRING.—David S. Abbott, Ischua, N. Y.
109,994.—PUMP-PISTON.—Joseph D. Alvord, Bridgeport, Conn., assignor to James Wilson, same place.
109,995.—HOLDER FOR SILK, &C.—Benjamin A. Armstrong, Jersey City, N. J., assignor to himself, James P. Brainard, New Haven, Conn., and Leonard O. Smith, Philadelphia, Pa.
109,966.—SAFETY-VALVE.—Jasper Armstrong, Brookfield, Mo.
109,997.—BRICK-MACHINE.—James M. Austin, Georgetown, Mo., assignor to Isaac Turner, same place.
109,998.—CAT-HEAD ANCHOR-STOPPER.—William Henry Barker, Windsor, Nova Scotia.
109,999.—SHOVEL-PLOW.—Isaac A. Benedict, West Springfield, Pa.
110,000.—LET-OFF AND TENSION MECHANISM FOR POWER-LOOMS.—Erastus Brigham Bigelow, Boston, Mass.
110,001.—CARPENTER'S VISE.—George F. Bissell, Oneonta, N. Y.
110,002.—SELF-LUBRICATING AXLE.—George P. Blaisdell, North Easton, Mass.
110,003.—STEAM-HEATER.—Edward Bourne, Pittsburg, Pa.
110,004.—CLEANER AND GRINDER FOR CARDING-MACHINES.—Leander W. Boynton, Hartford, Conn.
110,005.—GAS-LAMP.—J. Hamilton Brown, New York, assignor to himself and Charles E. Ball, Jamaica, N. Y.
110,006.—ADJUSTABLE SHACKLE FOR CARRIAGE-SPRINGS.—John Bullard, North Hyde Park, Vt.
110,007.—TOOL-CHEST.—George F. Card, Piper City, Ill.
110,008.—EXHAUST-VALVE.—William A. Carns, Malden, Mass.
110,009.—WATER-WHEEL.—Daniel W. Case, Garden City, Minn.
110,010.—STAMPING-MILL OR CRUSHER.—George F. Case, Windsor, Vt., assignor to himself and Milan C. Bullock, same place.
110,011.—HAY AND COTTON-PRESS.—Nathan Chapman, Hopedale, Mass.
110,012.—WOVEN FRINGED FABRIC.—Peter Cocker, Philadelphia, Pa., assignor to himself and William I. McBride, same place.
110,113.—TABLE.—George J. Congle, Chippewa Falls, Wis.
110,014.—CORN-CUTTER.—Henry V. Corbett, Allendale, Mich., assignor to George W. Amigh, same place.
110,015.—FEED-REGULATOR.—William T. H. Daniels, Belleville, Ohio,
110,016.—ALARM ATTACHMENT FOR CLOCKS.—Joseph H. Davis, Chilicothe, Mo.
110,017.—COFFEE-ROASTER.—Noah Davis, Boston, Mass.
110,018.—INKING APPARATUS FOR PRINTING-PRESSES.—Fred. Otto Degner, Brooklyn, E. D., N. Y.
110,019.—LAND-ROLLER.—George C. Dolph, West Andover, Ohio.
110,020.—HINGE.—Rudolf Drahota, Philadelphia, Pa.
110,021.—TRUMPET FOR SPINNING-MACHINES.—George Draper, Hopedale, Mass.
110,022.—ROTARY-ENGINE.—Richard Dudgeon, New York, N. Y.
110,023.—MACHINE FOR MIXING THE MATERIALS TO FORM ARTICIAL STONE, &C.—Josiah S. Elliot, Boston, Mass., assignor to "The Union Stone Company," same place.
110,024.—BREECH-LOADING FIRE-ARMS.—William H. Elliot, New York, N. Y.
110,025.—MEDICAL COMPOUNDS AND APPARATUS FOR MAKING THE SAME.—Peter Fahrney, Chicago, Ill.
110,026.—DOOR-STOP.—William H. Fahrney, Rockford, Ill., assignor to himself and John Donaldson, same place.
110,027.—MANUFACTURE OF PAINTS.—Frederick W. Gerdes, Allegheny City, Pa.
110,028.—PIPE-COUPLING.—George C. Germain, Cuyahoga Falls, Ohio.
110,029.—MACHINE FOR MIXING "BATCH" FOR GLASS.—William T. Gillinder, Philadelphia, Pa.
110,030.—MODE OF ATTACHING BOOT AND SHOE-HEELS.—Benjamin Giroux, Chicago, Ill.
110,031.—HAND-STAMP.—Edward S. Goodman, New Orleans, La.
110,032.—TYMPAN-SHEET FOR PRINTING-PRESSES.—John Gorman, Portland, Me.
110,033.—WASHING-MACHINE.—Dewitt Clinton Harlow, Hannibal, Mo.
110,034.—DEVICE FOR DRIVING SEWING-MACHINES.—Abraham W. Harris, Providence, R. I.
110,035.—PISTON-ROD PACKING.—William Hartley, Rockford, Ill.
110,036.—NAUTICAL ALARM.—John F. Haskins, Fitchburg, Mass.
110,037.—MODE OF ATTACHING COMPOSITION HEELS TO BOOTS AND SHOES.—Charles H. Helms, Poughkeepsie, N. Y.
110,038.—CORE FOR CASTINGS.—John Herald, Unadilla, N. Y.
110,039, antedated December 1, 1870.—CULINARY VESSEL.—Richard M. Hermance, Troy, N. Y.
110,040.—LUBRICATOR.—Milan Hinman, West Stockbridge, Mass., assignor to himself and Robert M. Stone, Des Moines, Iowa.
110,041.—SEMI-ROTARY VALVE.—Josephus F. Holloway, Cleveland, Ohio.
110,042.—REFINING AND DECOLORIZING SIRUPS AND OTHER LIQUIDS, AND IN MATERIAL FOR THE SAME.—Duane Hull, Brooklyn, N. Y.
110,043.—BURGLAR-ALARM.—Marshall J. Hunt, Rising Sun, Md.
110,044.—STEAM-JET BOILER-TUBE CLEANER.—Roland C. Hussey, Milford, assignor to himself and Augustus O. Corbett, Boston, Mass.
110,045.—TUCK-CREASING ATTACHMENT FOR SEWING-MACHINES.—John C. Jensen, Chicago, Ill.
110,046.—CULTIVATOR.—Freeman C. Jewell, Rahway, N. J.
110,047.—CHURN.—John W. Jordan, Lexington, Va.
110,048.—PRINTING-INK.—Julius Kircher, Cannstadt, near Stuttgart, Wurtemburg.
110,049.—GLASSWARE AND METAL STEM-CONNECTION.—Charles Louis Knecht, St. Clair, and Thomas Adams, Stow Township, Pa.
110,050.—LOOM.—William Samuel Laycock, Sheffield, England.
110,051.—BUHL-SAW.—Thomas Leavitt, Everett, assignor to "Sonent Wood-Carving Company," Boston, Mass.
110,052.—CARTRIDGE-CAP EXTRACTOR.—John Logan and Daniel W. Eldredge, Boston, Mass.
110,053.—CHAIR.—Charles R. Long, Louisville, Ky.
110,054.—PURIFYING BENZINE.—George Lupton, Indianapolis, Ind.
110,055, antedated November 26, 1870.—LAMP-BURNER.—Geo. Lupton, Indianapolis, Ind.
110,056.—MOLD FOR MAKING GLASS-WARE.—James B. Lyon, Pittsburg, Pa.
110,057.—VELOCIPEDE.—Henry A. Maltby, Brownsville, Texas.
110,058.—HAIR-RESTORATIVE.—Allen C. Maxfield, Biddeford, Me.
110,059.—LIFE-RAFT.—David McFarland, New York, assignor to A. M. Ingersoll, Brooklyn, N. Y.
110,960.—BELT-SPLICE POINT-FINISHER.—John Cummings, McLaren, Montreal, Canada.
110,061.—FIELD CORN-PICKING AND HUSKING-MACHINE.—George Meader and Charles Meader, Prairie Centre, Ill.
110,062.—LIQUID METER.—Charles Moore, New York, N. Y., assignor to Jose F. De Navarro, same place.
110,063.—TRUSS.—Charles Morrill, New York, N. Y.
110,064.—APPARATUS FOR DRESSING AND FURROWING MILLSTONES.—James Lee Norton, London, England.
110,065.—ANIMAL-TRAP.—Ebenezer Oliver, New York, N. Y.
110,066.—HITCHING-POST.—William S. Owings, Pan Handle Post Office, West Va.
110,067.—BOBBIN-WINDER FOR SEWING-MACHINES.—John L. Patch, Charlestown, assignor to himself and E. F. Tilden, Boston, Mass.
110,068.—ELASTIC MANE-TURNER.—Chamberlayne Phelps, Clayton, N. Y.
110,069, antedated December 9, 1870.—CHAIN-CLUTCH.—Hiram Pitcher, Fond Du Lac, Wis., assignor to himself and H. & G. O. Trowbridge, same place.
110,070.—DEVICE FOR ATTACHING THE SHANK TO MINERAL AND COMPOSITION BUTTONS.—Charles L. Potter, Providence, R. I.
110,071.—COMBINED LOCK AND LATCH.—Francis M. Ranous, Yreka City, Cal.
110,072, antedated December 10, 1870.—BASKET FOR TILE-GRINDERS.—Peter C. Reuters, Pittsburg, Pa.
110,073.—DEVICE FOR TRIMMING CYLINDRICAL BRUSHES.—Arthur G. Risley, Utica, N. Y.
110,074.—LEATHER FOR NECK-YOKE FOR CARRIAGES.—Henry Sanders, Utica, N. Y.
110,075, antedated December 9, 1870.—MACHINE FOR CUTTING CORKS.—Eilert O. Schartau, Philadelphia, Pa.
110,076.—CORK-MACHINE.—Eilert O. Schartan, Philadelphia, Pa.
110,077.—TYPE-SETTING MACHINE.—William Stephenson Shipley, Jersey City, N. J.
110,078.—SASH-LOCK.—Christian Shell, Mount Joy, Pa.
110,079.—MORTISING-MACHINE.—William H. Sible, Harrisburg, Pa.
110,080.—PLOW-CLEVIS ATTACHMENT.—Henry C. Sieverling, Carrollton, Ind.
110,081.—PROCESS OF REMOVING EARTHY MATTERS FROM BRONZE AND AND OTHER CASTINGS.—Michael Smith, Somerville, Mass., assignor to Russell & Erwin Manufacturing Company, New Britain, Conn.
110,082.—SAFETY-VALVE.—Henry F. Snyder, Williamsport, Pa.
110,083.—BASE-BURNING STOVE.—Israel Snyder and Peter C. Garrett, Cedar Rapids, Iowa.
110,084.—MANUFACTURE OF ALUM AND FERTILIZERS FROM MINERAL PHOSPHATES.—Peter Spence, Newton Heath, Manchester, Great Britain.
110,085, antedated December 9, 1870.—HEAD-BLOCK FOR SAW-MILLS.—Franklin J. Staley, Indianapolis, Ind., assignor to Long, Joseph & Carter, same place.
110,086.—JOURNAL-BOP.—Edward H. Stearns, Erie, Pa.
110,087.—STENCH-TRAP.—Daniel C. Stillson, Charlestown, Mass.
110,088.—CAR-COUPLING.—Augustus F. Street, Zanesville, Onio.
110,089, antedated November 26, 1870.—METHOD OF UNITING WOOD.—John A. Thompson, Auburn, N. Y.
110,090.—TELEGRAPHIC RELAY.—Benjamin Birdwood Toye, Toronto, Canada.
110,091.—TREE-PROJECTOR.—Charles Henry Trumbull, Marion, N. Y.
110,092, antedated December 9, 1870.—ALARM-TILL.—Cyrus Tucker and William H. Tucker, Indianapolis, Ind.
110,093.—RAILWAY AXLE-BOX.—James Wardrobe, Charles D. B. Fisk, John F. Curtis, and George Fetley, Carlin, Nevada.
110,094.—EXTENSION LADDER.—Thomas Watson and Charles Perry, Brooklyn, N. Y.
110,095.—DOUBLE-TREE FASTENER.—Decatur Werst, South Bend, Ind., assignor to himself and Joshua Laffin, same place.
110,096.—BARREL.—James W. Weston, New York, N. Y.
111,097.—PATTERN FOR MEASURING AND LAYING OUT GARMENTS.—Fannie Wetmore Chicago, Ill.
110,098, antedated November 26, 1870.—ROLLER-SHAFT FOR WRINGERS.—Levi H. Whitney, Washington, D. C.
110,099.—FAUCET.—Franz Weisenhofer, Fremont, Ohio.
110,100.—WEIGHING-WAGON.—George A. Wilcox, Chicago, Ill.
110,101.—SCHOOL-DESK.—Elijah Wilson, New Brighton, Pa.
110,102.—MANUFACTURE OF EMERY-WHEELS.—John F. Wood, Boston, Mass., assignor to "The Union Stone Company," same place.
110,103.—FRICTION-BLOCK FOR ATTACHING CULTIVATOR AND OTHER TEETH.—William Workman and Jason Hitchcock, Ripon, Wis.
110,104.—HEATING-STOVE.—Thomas Young, Montreal, Canada, assignor to Ives & Allen, same place.
110,105.—CHEESE-PRESS.—Robert Allen, Cleveland, Ohio.
110,106.—BARREL CHAMFERING AND CROZING-MACHINE.—Truman M. Annis and Thomas B. Luce, Linden, Mich.
110,107.—WAGON.—Ephraim Ball, Jr., Canton, Ohio.
110,108.—PRESERVING SWEET POTATOES.—Hedgemon T. Basye, Dyersburg, Tenn.
110,109.—MACHINE FOR TILLING OR CULTIVATING.—Henry Belmont, Romford, England
110,110.—STEAM-JET PUMP.—Albert J. Blakslee and Garner C. C. Williams, Du Quoin, Ill.
110,111.—MEAT AND VEGETABLE-CUTTER.—George E. Bringman, Philadelphia, Pa.
110,112.—REFRIGERATOR.—Andrew J. Chase, Boston, assignor to himself and Perrin C. Disko, Boston (Highlands), Mass.
110,113.—BRICK-PRESS.—James F. Clark, Morenci, Mich.
110,114.—STEAM-PIPE COUPLING FOR RAILROAD-CARS.—Joseph Conner, Philadelphia, Pa.
110 115.—BUCKLE.—Eugene P. Corwin, Washington, Ill.
110,116.—BOAT-DETACHING APPARATUS.—John C. Cottingham, Philadelphia, Pa.
110,117.—CAR-AXLE-BOX COVER.—David Cowley, Erie, Pa.
110,118.—FURNACE FOR BURNING SHAVINGS.—Louis Crandall, New York, N. Y.
110,119.—HEAD-BLOCK.—Perley M. Cummings, Cincinnati, Ohio, assignor to himself and Joseph O. Clark, Erie, Pa.
110,120.—PIANO-FORTE ACTION.—Willard G. Day, Baltimore, Md.
110,121.—ASPHALT ROAD AND PAVEMENT.—Edward J. Desmedt, New York, N. Y., assignor to Guanamite Asphalt Company, same place.
110,122.—OAT-CLEANER.—Simon Dickens, Jr., Milwaukee, Wis.
110,123.—GROOVING-TOOL.—Joseph Dill, Grand Rapids, Mich.
110,124.—MACHINE FOR SEPARATING COCKLE FROM WHEAT.—William G. Douglas and Hugh Thomas Douglas, Warrenton, Va., and John Milton Reed, Omaha, Nebraska
110,125.—COFFEE, TEA, AND SPICE-CAN.—James M. Earle, Springfield, Mass.
110,126.—HOE.—James Fairley and Alfred Fairley, Birmingham, England.
110,127.—BUNG-ELEVATOR.—David F. Fetter, New York, N. Y.
110,128.—CUT-OFF FOR CISTERNS.—Frank Fischer, Quincy, Ill.
110,129.—NOTES, CHECKS, &C., TO PREVENT ALTERATION.—Charles Folsom, New York, N. Y.
110,130.—COAL-BARGE.—Lawrence F. Frazee, Jersey City, N. J.
110,131.—GRAIN-THRASHER AND SEPARATOR.—Henry Gill, Mansfield, Ohio.
110,132.—TREADLE FOR SEWING-MACHINES.—James W. W. Gordon, Newport, Ky.
110,133.—HARROW.—James M. Harper, El Paso, Ill.
110,134.—COTTON-SEED HULLER.—Jackson Harrington, New London, Conn.
110,135.—HAY ELEVATOR AND CONVEYER.—Thomas E. Haymond, Morris, Ill.
110,136.—WELL-TUBING.—George W. Hemenway, Elmira, N. Y.
110,137.—CLOTHES-DRIER.—Israel Hogeland, Indianapolis, Ind.
110,138, antedated December 3, 1870.—GRAIN-BINDER.—Albert S. Hoyt, Winona, Minn.
110,139.—FARMERS' BOILER.—Joseph H. Hunter, Pennington Point, Ill.
110,140.—BRAKE FOR SEWING-MACHINES.—James W. Jacob, Jeffersonville, Ind., assignor to himself and John J. O'Donnell, same place.
110,141.—VEHICLE.—John Jack, Tiskilwa, Ill.
110,142.—HARROW.—David L. Jaques, Hudson, Mich.
110,143.—PILE FOR ARMOR-PLATES.—Joshua Jeavons, Sheffield, England.
110,144.—NEEDLE-SETTER FOR SEWING-MACHINES.—Jacob Karr, Washington, D. C.
110,145.—CLOTHES-DRIER.—James W. Kenning, Quincy, Mich.
110,146.—MECHANISM FOR OPERATING SHUTTLE-BOXES IN LOOMS.—Lucius J. Knowles, Warren, Mass.
110,147.—SIDE-SADDLE TREE.—Andrew Lawrence, Louisville, Ky.
110,148, antedated December 6, 1870.—COVER FOR TEA AND COFFEE CUPS.—Joseph Leach, New Harmony, Ind.
110,149.—COTTON-RENOVATING MACHINE.—James B. Lyons, Milton, Conn.
110,150.—SPRING SEAT FOR VEHICLES.—Wait Mead, Francis D. May, and Rufus L. Hoyt, Chestertown, N. Y.
110,151.—GEARING FOR MACHINERY.—Thomas M. Millett, Sr., Savannah, Ga.
110,152.—MILK-CARRIER.—Lewis Morris, Havre de Grace, assignor to himself and George W. Baker, Aberdeen, Md.
110,153.—WOOD PAVEMENT.—William S. Morse, Washington, D. C.
110,154.—WROUGHT-IRON COLUMN.—John W. Murphy, Philadelphia, Pa.
110,155.—FLOUR-PACKER.—Addison H. Nordyke, Richmond, Ind.
110,156.—LUBRICATOR.—Thomas J. Nottingham, Cincinnati, Ohio.
110,157.—COAL-GRATE.—Ira Packard, Lena, Ill., assignor to himself and James W. Slaght, same place.
110,158.—STEAM-BOILER.—Patrick Quinn, South New Market, N. H.
110,159.—SASH-BALANCE.—Charles R. Rand, Dubuque, Iowa.
110,160.—ANTI-FRICTION BOXES FOR AXLES.—William O. Reid, Vienna, N. C.
110,161.—COMPOUND FOR BATING HIDES AED SKINS.—Louis F. Robertson, New York, N. Y.
110,162.—IMPLEMENT FOR REMOVING CORNS, BUNIONS, &C.—Charles L. Roorbach, St Clair, Pa.
110,163.—MATERIAL FOR BEARING-SURFACES IN MACHINERY.—John Schiedt, New York, N. Y.
110,164.—STRAW-CUTTER.—Valentine J. Shryock, Folsomville, Ind.
110,165.—SAND-PAPERING MACHINE.—Samuel F. Smith, Indianapolis, Ind., assignor to Osgood, Smith & Co., same place.
110,166.—SELF-ACTING VALVE OR CUT-OFF FOR LIQUID CANS.—Heman S. Snow, West Meriden, Conn.
110,167.—FRUIT AND VEGETABLE-PARER.—Henry Soggs, Columbus, Pa.
110,168.—SPOKE-SHAVE.—George N. Stearns, Syracuse, N. Y.
110,169.—WATER-WHEEL.—Ralph Stinson, Whitesville, Mo.
110,170.—FENCE.—William W. Sullivan, Liberty, Ind.
110,171.—SHUTTLE-OPERATING MECHANISM FOR LOOMS.—Enoch P. Terrell, West Liberty, Ohio.
110,172.—INDIA-RUBBER AND COMBINATION HOSE.—William A. Torrey, Mount Clair, N. J.
110,173, antedated December 3, 1870.—BRIDGE.—Marshal Turly, Council Bluffs, Iowa.
110,174.—UPHOLSTERING-SPRING.—Henry C. Velie, Poughkeepsie, N. Y.
110,175.—MECHANICAL MOVEMENT.—William Walker, Odin, Ill.
110,176.—NAIL-EXTRACTOR.—Wesley G. Ward, Fayette, N. Y.
110,177.—PUMP.—Wesley G. Ward, Fayette, N. Y., assignor to to himself and Abram M. Flickinger, same place.
110,178.—NECK-TIE SUPPORTER.—William A. Wicks, Baltimore, Md.
110,179.—MACHINE FOR MAKING COUPLING-PINS.—Charles H. Williams, Cleveland, Ohio.
110,180.—MOP-HEAD.—Lewis Williams, Arlington, Vt.
110,181.—WASHING-MACHINE.—George L. Witsil, Philadelphia, Pa.
110,182.—PUMP.—Henry E. Wolcott, Elbridge, N. Y., assignor of two thirds of his right to Russell B. Wheeler and Ezekiel B. Hoyt.
110,183.—WAGON-BRAKE.—Jacob Wölfla, Cincinnati, Ohio, assignor to the Union Omnibus and Wagon Manufacturing Company, same place.
110,184.—MACHINE FOR BENDING PLOW-HANDLES.—Jacob Woodburn, St. Louis, Mo. and Samuel F. Smith Indianapolis, Ind., assignors to Osgood, Smith & Co., Indianapolis, Ind.
110,185.—MECHANICAL MOVEMENT.—Jacob Wolf, Burr Oak, Mich.
110,186.—PEN.—George Washington Woolley, Washington, D. C.

REISSUES.

4,196.—TUCK-CREASING DEVICE FOR SEWING-MACHINES.—James Bolton, Chicago, Ill., assignor to The Singer Manufacturing Company.—Patent No. 46,871, dated March 21, 1865.

4,197.—INKSTAND.—Samuel Darling, Providence, R. I.—Patent No. 51,931, dated January 9, 1866.

4,198.—METALLIC ROOFING.—Seymour Hughes, Hudson City, N. J.—Patent No. 103,887, dated June 7, 1870.

4,199.—BIT-STOCK.—Levi J. Gunn and Charles H. Amidon, Greenfield, Mass., assignees of A. C. Moore.—Patent No. 16,931, dated March 31, 1857.

4,200.—GEARING FOR MOWING-MACHINES.—Joel V. Strait, Litchfield, Ohio.—Patent No. 95,950, dated October 19, 1869.

4,201.—FURNACE FOR BURNING BONE-BLACK AND OTHER SUBSTANCES.—Adam Weber, New York, N. Y.—Patent No. 65,457, dated June 4, 1867.

4,202.—COMBINED INDIA-RUBBER AND STEEL SPRINGS.—The National Spring Company, New York, N. Y., assignee of Erastus T. Bussell.—Patent No. 10,280, dated November 29, 1853; extended seven years.

DESIGNS.

4,503.—FRAME FOR A PAPER-BAG MACHINE.—Charles F. Annan, Boston, assignor to himself and Herbert S. Merrill, Cambridge, Mass.

4,504.—BASE OF A HOT-AIR FURNACE.—Robert Boyd and James C. Hart, Rochester, N. Y.

4,505.—SCYTHE.—Charles P. Crossman, West Warren, assignor to himself, D. Frank Hale, and Sidney Sanders, Chicopee, Mass.

4,506.—BROOM.—Richard W. English, Buffalo, N. Y.

4,507.—CARPET-PATTERN.—Hugh S. Kerr, Philadelphia, Pa., assignor to Israel Foster, same place.

4,508.—CARPET-PATTERN.—William Mallinson, Halifax, England, assignor to W. & I. Sloane, New York City.

4,009.—CARPET-PATTERN.—William Mallinson, Halifax, England, assignor to W. & I. Sloane, New York City,

4,510.—COAL-BOX.—Robert W. Newberry, New York, N. Y.

4,511.—COAL-BOX—Robert W. Newberry, New York, N. Y.

4,512.—CENTER-PIECE FOR CEILINGS.—Joseph Woolman Reeves, Philadelphia, Pa. assignor to W. H. French, same place.

4,513.—CENTER-PIECE FOR CEILINGS.—Joseph Woolman Reeves, Philadelphia, Pa., assignor to W. H. French, same place.

4,514.—SHOW-CASE.—Robert Jordan Roberts, New York, N. Y.

4,515.—COOKING STOVE.—John R. Rose and Edward L. Caley, Philadelphia, Pa., assignors to "Armstrong Company," Port Deposit, Md.

4,516.—BRACELET.—Theron I. Smith, Attleborough, Mass.

4,517.—HOE.—Barna T. Stowell, Quincy, Ill.

4,518.—WOVEN FABRIC.—Royal C. Taft, William B. Weeden, and James W. Taft, Providence, R. I.

4,519.—WOVEN FABRIC.—Royal C. Taft, William B. Weeden, and James W. Taft, Providence, R. I.

4,520.—WOVEN FABRIC.—Royal C. Taft, William B. Weeden, and James W. Taft Providence, R. I.

4,521.—PLOW-SHARE.—Richard Henry Taylor, Lincoln, Va.

TRADE MARKS.

96.—RAZOR-STRAP.—Benjamin F. Badger, Everett, Mass.

97.—WAGON-AXLE.—D. Arthur Brown & Co., Fisherville, N. H.

98.—ROOT AND HERB BITTERS.—Flint & Co., Providence, R. I.

99.—MEDICAL COMPOUND.—George C. Furber, Yreka, Cal.

100.—BROOM AND BRUSH.—L. Y. Gardiner & Co., Amsterdam, N. Y.

101.—WHISKY.—W. A. Gaines & Co., Frankfort, Ky.

102.—WHISKY.—W. A. Gaines & Co., Frankfort, Ky.

103.—WHISKY.—W. A. Gaines & Co., Frankfort, Ky.

104.—WHISKY,—W. A. Gaines & Co., Frankfort, Ky.

105.—LEATHER.—George F. Page and Charles T. Page, Franklin, N. H.

106.—CIGAR, SNUFF, AND TOBACCO,—Lorin Palmer, New York, N. Y.

107.—OIL.—Charles Pratt, New York, N. Y.

108.—CUTLERY.—Robert J. Roberts, New York, N. Y.

EXTENSIONS.

WILLIAM N. WHITELEY, of Springfield, Ohio.—Letters Patent No. 16,131, dated November 25, 1856; reissue No. 1,203, dated June 25, 1861; reissue No. 1,614, dated February 2, 1864.—Division A.

WILLIAM N. WHITELY, of Springfield, Ohio,—Letters Patent No. 16,131, dated November 25, 1856; reissue No. 1,203, dated June 25, 1861; reissue No. 1,615, dated February 2, 1864.—Division B.

JOHN TYLER, of West Lebanon, N. H.—Letters Patent No. 15,389, dated July 8, 1856; reissue No. 3,015, dated June 30, 1868.

THEODORE T. WOODRUFF, of Philadelphia, Pa.—Letters Patent No. 16,160, dated December 2, 1856.

THEODORE T. WOODRUFF, of Philadelphia, Pa.—Letters Patent No. 16 159, dated December 2, 1856; reissue No. 1,439, dated March 17, 1863.

JAMES APPERLY and WILLIAM CLISSOLD, of Dudbridge, England.—Letters Patent No. 18,838, dated December 22, 1857; antedated December 4, 1856.

Diamond Mining in New South Wales.

By Mr. JOHN HUNT, Sen., late Manager of the Australia: Diamond Mining Company's Works,

THE greatest quantity of diamonds obtained up to the present time may be said to have been washed from the alluvial drift at Reedy Creek, Two-Mile Flat, Hassall's Hill, Horseshoe Bend, Rocky Ridge, and a few other places on the borders of the Cudgegong river, Mudgee. The gravelly matter washed from the bed of this river has produced diamonds also, but, owing to the frequent floods, which have proved a sad drawback on mining operations, no extensive trials have been made; indeed, the placing of heavy machinery on the river would be hazardous, particularly in the winter season. As soon as the rivers get low, it is not unlikely that portable machines will be used with some success in obtaining both gold and diamonds.

This branch of industry (diamond mining) may be said to be in its infancy in this part of the globe, and it will require money, time, perseverance, and practical experience before anything definite can be said as to its becoming a commercial success. It is wonderful how soon men, women and children in this district have learnt to know what a diamond is, but the study of the various gems and other stones which accompany the diamond in the alluvial drift, have not received that attention which is necessary to enable the miner to judge as to the probability of success or otherwise.

It is quite true that the diamonds are found more or less patchy, as the miners call it; for instance, at Reedy creek, a piece of ground about 900 superficial yards produced from one to four diamonds to the load, and about two pennyweights of gold, which is invariably found more or less with the diamonds. The alluvial drift in this particular spot averaged about three feet thick, but, strange to say, outside of the area above mentioned, for some little distance the drift contained scarcely one diamond to five loads. Here, like in many other mining operations, is a difficulty not easily overcome, in selecting payable drift, but the diamond miner may hope for success in a diamond district when the following precious stones and minerals are found in the drifts—rubies, sapphires, zircons (generally too small to be of any value), pleonaste, topazes, Barkleyite, and a variety of the corundum family, easily known by its hardness. Next, but not least in importance as a guide, is a black siliceous stone, with a smooth shining surface when rubbed with the hand, some of them not unlike a black kidney bean in size and appearance. Rather harder and of somewhat greater specific gravity than common quartz, a kind of opaline quartz, about the size of a small pea, is also found, and some brownish quartz crystals, which appear to have been derived from decomposed granite, accompany the drifts more or less. Petrified wood is also found in some places, in which the carbon of the wood seems to have been replaced by silica.

I will now call attention to a green mineral, which I have never found except in a diamond district. The color green is caused by the presence of phosphate of iron. In examining some of the alluvial drifts, it looks as if the phosphate of iron had been formed since the drift was deposited. That this particular mineral is found in diamond-producing districts, not only in New South Wales, but elsewhere, is a fact known. Mr. JOHN T. HUNT visited a place in South Australia, some months since, where diamonds had been found, and he brought me back a piece of this green mineral (phosphate of iron), which I recognized as the same kind as that I had found here. It would be a task to enumerate all the different stones and minerals found with the diamond; but the before-mentioned, with few exceptions, are what I have found the most conspicuous as a guide in working the diamond-producing drifts. In some places most of the gold and diamonds are in the upper part of the drift; in others it is towards the bottom. In such cases, a trial on a small scale by a man conversant with the usual indications would save both time and labor. The geological features of this district have been so well described by geologists, that it is not necessary to refer to it, beyond the fact that the greatest quantity of diamonds is found in the drift, either covered by or near the basaltic rocks.

Up to the present about 5,500 diamonds have been received; the largest weighed 5⅛ carats, and the smallest I have yet seen was about one-tenth part of a grain. The average weight is found to be about one grain each. The greater part of these stones are beautifully clear; but a few red, green, yellow and black have been found. I have only two or three stones approaching the inferior kind of diamond called boart; but I have no doubt it will be found ultimately in greater or less quantities. At present few people know what it is when they see it. Like mining for the glittering gem, it has to be learnt. A few diamonds have been picked up accidentally, and some have got in washing for gold in the cradle (a very imperfect principle for saving fine gold and precious stones), but the great bulk have been saved in Hunt's Patent Gold and Diamond Washing Machine, which, when properly worked, loses neither fine gold nor precious stones. There are at present eight or ten of these machines on the different diggings.

The mode of washing the alluvial drift at the Australian Diamond Mines Company's works is as follows:—The drift is carted to an inclined platform boarded on each side, at the bottom of which is a cast-iron plate two feet square, made with conical holes, the upper part being ⅛ inch in diameter; on this the matter under treatment is drawn, and a jet of water falling from a height six feet washes off the adhesive clay, etc.; and all that goes through the perforated plate, which is facilitated by moving it about under the jet of water, goes down a launder, placed at an angle, to a box from which the machine is fed; the surplus muddy water escapes at the side. After about ten loads have been operated upon, the contents resting on the finely pierced copper plate are removed and spread on a sort of table, and the diamonds picked out, as well as other gems of commercial value. In working the small portable machines, the mode of separating the adhesive clay and stones in the wash-dirt or drift is varied according to circumstances. The fine gold passes into the body of the machine. Except under very favorable circumstances, less than two dwts. of gold and one diamond of the average weight to the load will not be found very profitable whilst wages remain at the present rate.—*London Mining Journal.*

The Hartford Steam Boiler Inspection and Insurance Co.

MAKES the following report of its inspections for the month of October, 1870: During the month 522 visits of inspection were made and 920 boilers examined—702 externally and 234 internally, while 136 were tested by hydraulic pressure. Number of defects in all discovered, 418; number of dangerous defects, 44—which in detail are as follows: Furnaces out of shape, 12—1 dangerous. Fractures in all, 13—5 dangerous. Burned plates, 22—2 dangerous. Blistered plates, 51—8 dangerous. Cases of sediment and deposit, 72—5 dangerous. Cases of incrustation and scale, 50—4 dangerous. Cases of external corrosion, 22—4 dangerous. Cases of internal corrosion, 15—1 dangerous. Cases of internal grooving, 5. Water gauges out of order, 4—2 dangerous. Safety valves over-loaded, 20—2 dangerous. Pressure gauges out of order, 74—varying from 10 to 20lbs. Boilers without gauges, 2—1 dangerous. Cases of deficiency of water, 8—2 dangerous. Broken braces and stays, 12. Boilers condemned, 6—6 dangerous. Two cases have been found where there were stop cocks between the safety valve and boiler. They were both removed before the boilers could be accepted by this company. Several mud drums have been found in bad condition. These drums are usually bricked in, and cannot be thoroughly examined unless the brick-work is removed. They corrode rapidly, and should be examined at least once a year. As will be seen, there have been eleven explosions during the month, by which nine persons were killed and many wounded. Several of these explosions were of *new* boilers. Many people think that when they have put new boilers in their works they are perfectly safe. Such, however, seems not to be the fact. One of the most terrific explosions which has occurred within the year was of a new boiler. From subsequent examination, a fracture was discovered in one of the flues, which was regarded as the cause of the accident From unequal expansion and contraction, resulting from urging the fires injudiciously, the fracture came, and so far as could be ascertained, the flue collapsed, and an explosion followed. The six boilers condemned have been replaced by new ones.

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In connection with the publication of the ENGINEERING and MINING JOURNAL and the MANUFACTURER AND BUILDER, we have frequently received applications from subscribers and patrons to act as their agents in transacting business with the United States Patent Office; and in view of the increasing number and urgency of such requests, we have resolved to add this department to our business. We have accordingly organized

A COMPLETE PATENT AGENCY,

and now offer our services in procuring patents in this and foreign countries, and transacting all business relating to the obtaining of patents.

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We have engaged as solicitor and manager Mr. CHARLES ROGERS, a well-known expert in this department. Being a practical mechanic, and having been an examiner in the Patent Office at Washington for a number of years, besides enjoying an experience of more than twenty years as a solicitor of patents, Mr. ROGERS is intimately acquainted with all the details of the business, both in and out of the office.

The specifications, drawings, etc., prepared in our office, will be found to compare favorably with those prepared by any other establishment, while the intimate acquaintance of our manager with the routine of business in the Patent Office, gives us a decided advantage in managing difficult cases.

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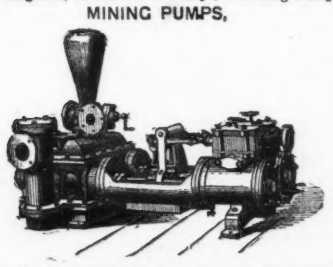

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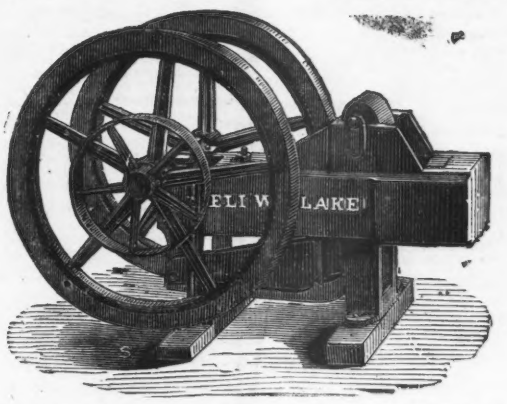

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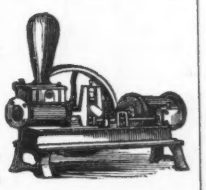

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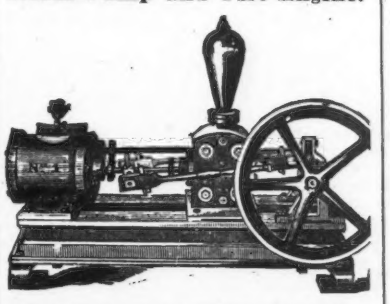

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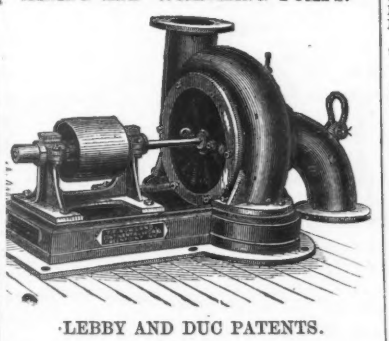

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Western and Company, Publishers,
37 Park Row, New York.

ANNUAL SUBSCRIPTION PRICE (invariably in advance), $1 50 each for less than four copies; four to nine copies, $1 25 each; ten to fourteen copies, $1 20 each; fifteen to nineteen copies, $1 10 each; twenty copies, $1 each. Papers are addressed to each name.

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—o—

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—o—

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In these days, CAPITAL is necessary for establishing the enormous circulation required to make a first-class periodical like THE MANUFACTURER AND BUILDER profitable in spite of its gigantic expenses. Capital is necessary to pay for the best productions of the best writers, for the costly designs and engravings, for the fine, thick paper, and for the extra style of printing, that make THE MANUFACTURER AND BUILDER the type of a new era in American polytechnic journalism. Capital is above all necessary to PAY THE ARMY OF CANVASSERS employed in bringing the merits and benefits of this journal home to the intelligent millions of the American people.

Our Plan for 1871
IS
CAPITAL WITHOUT STINT
For these purposes, and
MAGNIFICENT PAY
To all who help us.

We desire to pay out the coming year not less than a Quarter of a Million of Dollars from our receipts and reserves, for the services of Volunteer Agents alone, in all the States, Territories, and Provinces of North America. Our paper challenges comparison with the best Journals of Arts and Engineering in the world. It is at the same time one of the cheapest publications ever issued from the press; and to all its attractions we now add a range of Premiums tantamount almost to a free gift of our paper, our labor, our earnings, for the year, for the sake of introducing THE MANUFACTURER AND BUILDER to myriads of readers, whose patronage in future years will recompense our present lavish outlay.

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In the following table is given the price of each article, and the number of subscribers required to get it free, at $1 50 a year; also at the club rate of $1 a year. The descriptions of a few articles are given in the fourth column, the balance is given in our *Descriptive Premium Sheet*, which will be sent on application to those who contemplate getting up clubs.

List of Premiums and Terms for Vol. III., 1871.

A Free Field for Everybody. No Competition.

No.	*Names of Premium Articles.*	*Price of Premium.*	*Number of Subscribers required at* $1 50	at $1
	FROM PATTERSON & BROS.			
1	—Tool Chest	$45 00	60	190
2	—Case Mathematical Instruments	9 00	18	65
3	—Case Mathematical Instruments	15 00	22	75
4	—Pocket Knife	1 50	4	21
5	—Pocket Knife	2 00	5	22
6	—Pocket Knife	2 50	6	25
7	—Lady's Pocket Knife	2 00	5	22
8	—One dozen Knives and Forks	14 00	21	70
9	—One dozen Knives and Forks	18 50	27	90
10	—One dozen Knives and Forks	22 00	33	110
11	—One dozen Knives and Forks	25 50	39	124
12	—Carver and Fork	5 00	13	37
13	—Fluted Sharpening Steel	2 50	6	25
	FROM HALL, ELTON & CO.'S PLATE.			
14	—One dozen Tea-spoons, medallion	5 75	14	40
15	—One dozen Table-spoons, medallion	12 00	19	65
16	—One dozen Table Forks, medallion	12 00	19	65
17	—Butter-Knife, medallion, solid	1 00	4	
18	—Soup-Ladle, medallion	5 75	14	40
19	—Ice or Water-Pitcher, No. 3	17 00	26	80
20	—Pocket Fruit Knife, No. 12	2 00	5	21
21	—Revolving Butter-Cooler, No. 80.	8 00	16	52
22	—Cake-Basket, No. 1867	10 00	18	58
23	—Caster, 6 bottles, chased, No. 2039	9 25	18	54
24	—Fruit-Basket, No. 200	13 50	21	75
25	—Child's Cup, No. 041	2 75	6	25
26	—Knife, Fork, and Spoon, child's set, morocco case	3 00	8	30
27	—One dozen Napkin-Rings, medallion	9 00	17	54
28	—Tea Set, gold lined, No. 1822	48 00	52	180
29	—Tea Set, No. 1866	36 00	45	135
	FROM COLBY BROS. & CO.			
30	—Knife-Cleaner	75	2	
	FROM MABIE, TODD & CO.			
31	—Gold Pen and Pencil, rubber case	8 00	15	45
32	—Gold Pen and Pencil, rubber case	6 75	13	37
33	—Gold Pen, silver or gold holder, in box	4 25	9	32
34	—Gold Pen, extension gold case, in box	20 00	29	90
35	—Lady's Gold Pen, ivory holder, in box	2 75	6	25
	FROM HENRY RUSSELL & CO.			
36	—Downer Mineral Oil Lamp, No. 19.6	4 75	10	35
37	—Downer Mineral Oil Lamp, No. 1963	9 25	17	56
	FROM C. F. A. HEINRICH.			
38	—St. Germain Student Lamp, largest size	8 25	15	45
	FROM FAIRBANKS & CO.			
39	—Family Scales	14 00	21	70
	FROM COLBY BROS. & CO.			
40	—Clothes-Wringer	7 50	10	35
	FROM ALEXANDER M. LESLEY.			
41	—Refrigerator, the Zero, No. 38	38 00	42	142
42	—Cooler, the Newport, No. 1	12 00	15	45
43	—Hot-Air Coal Furnace, the Gothic, No. 9	125 00	135	450
44	—Hot-Air Wood Furnace, Gothic, No. 10	150 00	162	525
	FROM THE STANLEY RULE & LEVEL CO.			
45	—Iron Smoothing-Plane, Bailey's patent	5 00	13	37
46	—Iron Smoothing-Plane, Bailey's patent	6 50	14	42
47	—Iron Jack-Plane, Bailey's patent	7 50	15	47
48	—Iron Fore-Plane, Bailey's patent	9 00	17	55
49	—Iron Jointer-Plane, Bailey's patent	10 00	18	58
50	—Wood Smoothing-Plane, Bailey's patent	3 00	8	30
51	—Wood Fore-plane, Bailey's patent	4 50	10	35
52	—Wood Jointer-Plane, Bailey's patent	4 75	12	36
53	—Wood Jointer-Plane, Bailey's patent	5 50	14	40
	FROM POST & GODDARD.			
54	—Machinists' Hand-Taps	17 60	25	75
55	—Machinists' Hand-Taps	52 80	65	220
56	—Machinists' Hand-Taps (your choice)			
57	—Screw-Plates and Dies, size A	5 00	12	37
58	—Screw-Plates and Dies, size B 1	8 00	15	45
59	—Screw-Plates and Dies, size C 1	10 00	18	58
60	—Screw-Plates and Dies, size D 1	13 00	20	70
61	—Tap-Wrenches, size A	3 00	7	25
62	—Tap-Wrenches, size B	4 00	9	30
63	—Tap-Wrenches, size C	5 00	12	37
64	—Set of 11 Taper Shank-Twist Drills, No. 1	19 75	29	90
65	—Set of 29 Drills, straight shank, mounted, No. 9	12 00	18	60
66	—Set of 60 Drills, steel wire gauge from 1 to 60, No. 12	8 00	15	45
67	—Set of 21 Taper-Shank Drills, No. 3	44 00	58	175
68	—Set of 9 Bit-Stock Drills, 1-16 to 3-8 in	2 80	6	25
69	—Self-Centering Drill-Chucks, Beach's patent, for jewelers, No. 0	10 00	18	58
70	—Self-Centering Drill-Chucks, Beach's patent, for drilling, No. 0	7 00	14	40
71	—Self-Centering Drill-Chucks, Beach's patent, 0 to 3-16, No. 1	6 00	13	38
72	—Self-Centering Drill-Chucks, Beach's patent, 1 to 60 S. W. E., No. IX	7 00	14	40
73	—Self-Centering Drill-Chucks, Beach's patent, 0 to ½, No. 3	14 00	23	77
74	—Drill-Grinding Machine, No. 1	10 00	18	58
75	—Drill-Grinding Machine, No. 2	20 00	30	95
76	—Auger-Bits, your choice of 4 sets	— —	—	—
	FROM L. W. POND.			
77	—Foot-Lathe, No. 1	50 00	65	204
78	—Foot-Lathe, No. 2	30 90	47	124
	FROM COLBY BROS. & CO.			
79	—Miniature Steam-Engine and Boiler	1 36	5	23
	FROM RUSSELL & SPEIR.			
80	—Steam-Engine (1 H. P.) and Boiler	300 00	310	1125
81	—Steam-Engine (3 H. P.) and Boiler	600 00	640	3250
82	—Steam-Engine (5 H. P.) and Boiler	800 00	858	3000
83	—Steam-Engine (10 H. P.) and Boiler	1200 00	1285	4500
84	—Steam-Pump, C. B. Hardick's, No. 0	120 00	155	540
85	—Steam-Pump, Cameron & Co.'s, No. 1	150 00	192	675
86	—Steam-Pump, Cameron & Co.'s, No. 2	200 00	257	900
87	—American Submerged Pump	12 00	19	65
	FROM GEORGE TALLCOT.			
88	—Turbine Water-Wheel, Reynold's, 12 in	105 00	125	360
89	—Turbine Water-Wheel, Reynold's, 24 in	226 50	270	800
90	—Turbine Water-Wheel, Reynold's, 36 in	384 50	460	1350
91	—Rotary Blower, Root's patent, No. 1	$52 50	70	275
92	—Rotary Blower, Root's patent, No. 2	80 00	105	420
93	—Portable Forge, Root's patent, No. 1	48 00	65	260
94	—Portable Forge, Root's patent, No. 3	80 00	105	420
	FROM THE AMERICAN SAW CO.			
95	—Circular Saw	125 00	135	473
96	—Cross-Cut Saw	6 6	14	42
	FROM A. P. & M. STEPHENS.			
97	—Labor-Saving Vise, 2-in. jaw	4 00	9	32
98	—Labor-Saving Vise, 4½-in. jaw	12 00	28	58
	FROM THE STANLEY RULE & LEVEL CO.			
99	—Boxwood two-foot Rule	2 50	6	25
100	—Silver-Plated Triangular Drawing-Scale	6 00	16	52
101	—Pocket Sheet-Metal Gauge	5 00	13	37
102	—Arkansas Oil-Stone	1 75	5	22
103	—Arkansas Oil-Stone, mahogany case	3 25	8	30
104	—Gear or Cog-Wheel Calculating-Rule	4 00	12	36
	WESTERN & COMPANY'S AGENCY.			
105	—Preparing and Filing a Caveat	25 00	28	80
106	—Application for a Patent	30to40	35	100
107	—Application for Patent and first Government fee	46to56	50	150
108	—Application for Patent and all Government fees	66to76	75	250
	FROM J. W. BUTCHINSON.			
109	—English Breech-loading double-barrel Gun	100 00	110	350
110	—English Muzzle-loading double-barrel Gun	75 00	85	250
111	—Breech-loading Rifle, the Allen	30 00	46	150
112	—Revolver, Smith & Wesson's, No. 1½	12 50	19	65
113	—Revolver, Smith & Wesson's, No. 2	15 00	22	75
	FROM MASON & HAMLIN.			
114	—Melodeon, portable, No. 1, 4 octave	50 00	66	200
115	—Melodeon, resonant, style G, 5 octave	170 00	146	510
116	—Pipe-Organ, church use, style No. 29	675 00	579	2000
	FROM J. S. & C. ODELL.			
117	—Pipe-Organ	500 00	430	1500
118	—Pipe-Organ	700 00	600	2100
119	—Bradbury Square Piano-Forte, No. 4	650 00	430	1500
120	—Steinway's No 1 Grand Piano	1200 00	860	3000
	THE AMERICAN WATCH CO., WALTHAM, MASS.			
121	—Silver Watch	20 00	32	100
122	—Silver Watch	35 50	48	142
123	—Gold Watch	50 00	65	200
124	—Lady's Gold Watch	100 00	110	350
	FROM THE UNITED STATES WATCH CO.			
125	—Silver Watch	40 00	50	150
126	—Silver Watch	66 00	75	275
127	—Gold Watch	100 00	100	300
128	—Silver Watch	104 00	104	312
129	—A Sewing Machine (your choice)	65 00	65	200
	FROM MCALLISTER.			
130	—Microscope and 45 objects	10 00	14	40
	FROM COLBY BROS. & CO.			
131	—Velocipede for Boys	16 00	16	52
	FROM MCALLISTER.			
132	—Magic-Lantern, No. 433	20 00	30	95
	FROM H. THOMPSON.			
133	—An Easy Chair			
	FROM D. APPLETON & CO.			
134	—New American Cyclopædia, 16 vols	80 00	80	213
	FROM G. & C. MERRIAM.			
135	—Webster's Unabridged Pictorial Dictionary	12 00	15	45
136	—Webster's National Pictorial Dictionary	6 00	10	35
	FROM WESTEN & COMPANY.			
137	—One back vol. Manufacturer and Builder, unbound, post-paid	1 75	6	25
138	—Two back volumes Manufacturer and Builder, unbound, post-paid	3 50	11	37
139	—One back vol. Manufacturer and Builder, bound, post-paid	2 50	9	32
140	—Two back volumes Manufacturer and Builder, bound, post-paid	5 00	18	58
141	—Cover for binding the Manufacturer and Builder, post-paid	60	3	21
142	—A $10 Library (your choice from list in special sheet),	10 00	18	58
143	—A $ 5 Library,	15 00	24	85
144	—A $20 Library,	20 00	31	106
145	—A $25 Library,	25 00	38	125
146	—A $30 Library,	30 00	44	144
147	—A $35 Library,	35 00	50	162
148	—A $40 Library,	40 00	56	177
149	—A $45 Library,	45 00	62	192
150	—A $50 Library,	50 00	68	207
151	—A $60 Library,	60 00	80	237
152	—A $75 Library,	75 00	100	282
153	—A $100 Library,	100 00	125	360
154	—A choice of good Books (see terms in another column)			
155	—A choice of convenient Book-Cases (see special sheet)			
156	—A choice of popular Music (see terms in special sheet)			
157	—A choice of Games and Toys, (see terms in special sheet)			

All paid through by mail or express.

We have taken especial pains to select in making up our price list the NEWEST and very BEST articles. No charge will be made for boxing or packing any article on our list. The Premiums, Nos. **4** to **7** inclusive, **31** to **35** inclusive, **79**, **99**, **101**, **105** to **108** inclusive, **121** to **128** inclusive, **137** to **141** inclusive, **154**, **156**, **157**, will each be delivered FREE of charge by mail or express (at the Post-office or express office nearest recipient) to any place in the United States or Territories. The other articles cost the recipient only the freight after leaving the manufactory of each, by any conveyance specified.

As an aid to those who engage upon large clubs, we will count subscriptions by *one* individual for 1869, 1870, and 1871, as *three* subscribers toward a premium. Every *new* subscriber should have the work upon the beginning. Bound volumes may be counted in the same way—each as one subscriber—except, of course, when they are obtained as a premium.

Do not fail to note the following Points:

1. All subscribers sent by one person count, though from one or a dozen different post-offices. But
2. State with each name or list of names sent that it is for a premium.
3. Send the names as fast as obtained, that the subscribers may begin to receive the paper at once. You can have any time, from one to six months, to fill up your list.
4. Send the exact money with each list of names, so that there may be no confusion of money accounts.
5. Old and new subscribers all count in premium clubs, but a portion, at least, should be new names; it is partly to get these that we offer premiums to canvassers.

N.B.—The extra copy to clubs of ten or twenty is not given where premium articles are called for.

6. Specimen numbers, cards, and show-bills will be supplied free, as needed by canvassers; but they should be used carefully and economically, as they are very costly.

7. Remit money in Checks on New York banks or bankers, payable to order of WESTERN & COMPANY, or send Post-Office Money Orders. If neither of these is obtainable, Register Money Letters, affixing stamps both for the postage and registry; put in the money and seal the letter in the presence of the postmaster, and take his receipt for it. Money sent in any of the above ways is at our risk.

DESCRIPTIVE LIST OF PREMIUMS.

Every Premium in the annexed list is described in the December MANUFACTURER AND BUILDER, *and also in a* **Special Descriptive Sheet**, *which will be sent* **free** *to every one desiring it. We have room here for the following only:*

Nos. 105 to 108—To Procure a Patent without Money.—We have met with many having valuable inventions, which inventors are anxious to get patented, but are unable to afford the expense, and consequently fail to secure the profits which a patent might produce. To such as are in this position, we make the following liberal offer: No. **108**—We will prepare an application for a patent, attend to its passage through the Patent Office, and pay all government fees and incidental expenses attending the same, for any inventor presenting a patentable invention, who will get up a club of seventy-five subscribers for THE MANUFACTURER AND BUILDER for one year at $1,50 each, or 250 at $1 each, and send us the money by post-office order. If this application should be rejected, they may send us an additional list of thirty subscribers at $1.50 each, and the subscription money for the same, on receipt of which we will prepare and prosecute a second application, paying all government fees and incidental expenses. No. **107**—For a list of fifty subscribers at $1.50 each, or 150 at $1 each, with the cash accompanying it, we will prepare an application, attend to its passage through the office, and pay the government fee ($15), the applicant paying the second government fee of $20. No. **106**—For a list of thirty-five subscribers at $1.50, sent in the same way, we will prepare and prosecute an application, the applicant paying the government fee. No. **105**—for twenty-eight subscribers at $1.50 each, or eighty at $1 each, we will prepare and file a caveat, furnish the necessary drawings, (which we also furnish in all the above cases), and pay all government fees. All cases placed in our hands under these arrangements will receive our best attention, equally with those for which our fees have been paid in cash, and will be appealed to the Board of Examiners-in-Chief if necessary, the applicant paying the government fee of $10 on such appeal. If the inventor has no model to accompany his application, he may procure additional subscribers, the premium on which (see cash rates) will enable him to pay for the model. A club of 100 names has been obtained in a single establishment where from 150 to 200 hands are employed. A village of 500 inhabitants will take this number readily.

No. 129—Sewing Machines.—Your choice! A $65 machine for 65 subscribers, at $1.50 each.—It makes no difference to us which machine we send, or whether it is selected at first or at the last moment. No charge for boxing the machines; they go safely as freight. For circulars, giving full particulars in regard to style of machines, fixtures, etc., as well as instructions, send to **Grover & Baker Manufacturing Co.**, 495 Broadway, New York; **Florence Sewing Machine Co.**, 505 Broadway, New York; **Wilcox & Gibbs Sewing Machine Co.**, 658 Broadway, New York; **Singer Sewing Machine Co.**, 458 Broadway, New York.

Nos. 137, 138—Volumes of the Manufacturer and Builder.—The unbound volumes of THE MANUFACTURER AND BUILDER consist of a set of numbers for a year, each separate in its own paper cover. These volumes amount to a valuable Library on all matters pertaining to the Industrial Arts, and contain more varied information on manufacturing building, and mechanical subjects than can be obtained in books costing three times as much. The price of the volumes unbound is $1.50 each, at the office, or $1.75 if sent by mail, as they must be post-paid. They are profusely illustrated, the engravings used in them having alone cost thousands of dollars. For ordinary use, the sets of numbers unbound will answer quite well.

Nos. 139, 140—Bound Volumes of the Manufacturer and Builder.—*New* subscribers almost invariably desire to secure the back numbers of THE MANUFACTURER AND BUILDER from its commencement. Some desire them bound in our uniform style, while others prefer to get the loose numbers and have them bound to suit their own tastes. *Our* binding is very neat, and being done in large quantities at one time, is furnished at a *very cheap* rate. It is moreover very handsome, being of cloth, with gilt title and back, sides embossed and ornamented with a neat architectural device stamped in gold. The price of the volumes is $2.50 each, sent post-paid.

No. 141—Covers for Binding the Manufacturer and Builder.—These are described in premium 139, 140. Now ready for 1869 and 1870. Be careful to state *which year* you require. Any country binder will insert the year's numbers in one of these covers at a moderate cost. Price, 50 cents; sent, *post-paid*, on receipt of three subscribers at $1,50 for each cover.

Nos. 142 to 154—Good Libraries.—In these premiums we offer a choice of books for manufacturers, mechanics, artisans, builders and others. The person entitled to any one of the premiums 142 to 153, may select any books desired from the list published in our Special Premium Sheet, to the amount of the premiums, and the books will be forwarded, post or express paid. $25 or $50 worth of books pertaining to the industrial arts will give the boys new ideas, set them to thinking and observing, and thus enable them to make their heads help their hands. Any good book will, in the end, be of far more value to a youth than to have an extra hundred dollars on coming to manhood. ☞ Let the mechanics of a neighborhood unite their efforts and through these premiums get an industrial library for general use.

No. 154—General Book Premium.—Any one sending twenty-five or more names may select books from our list to the amount of ten cents for each subscriber sent at $1; or thirty cents for each name sent at $1.20; or sixty cents for each name at $1.50. *This offer is only for clubs of twenty-five or more. The books will be sent by mail or express, prepaid through by us.*

SPECIMEN COPIES, CIRCULARS, SHOW-BILLS, etc.,

will be furnished free of charge in sufficient quantities to meet the reasonable requirements of agents. We would respectfully request that they do not waste them, but distribute them judiciously. If some unexpected event should prevent them from continuing in the business, they will do the square thing by us by giving their outfit to some friend, who will continue the business where they have left off; and who will no doubt be grateful for the opportunity of receiving profitable employment.

Postage.

Every subscriber pays his own postage at the office where he receives the paper. This is only twenty-four cents per year, or six cents per quarter, payable in advance.

Don't Give up Your Town

until everybody has been supplied with a circular and has had a chance to subscribe; and be sure that you

PUBLICATIONS.

leave your address, so that they may know where to find you in case they should make up their minds to take the magazine after you have left them. Make all drafts, money-orders, and registered letters payable to the order of Western & Company, publishers, and address all communications

WESTERN & COMPANY, Publishers,
NO. 37 PARK ROW, NEW YORK.

TABLE OF CASH PREMIUMS For 1871.

EVERY MAN HIS OWN PAY-MASTER. STEADY EMPLOYMENT AND GOOD PAY.	PREMIUMS. At $1 50 each.	PRE'S. At $1 00 each.
For every club of 4 subscribers.....	$1 00	
" " " 10 "	3 00	
" " " 15 "	6 00	
" " " 20 "	10 00	
" " " 30 "	16 50	$1 50
" " " 40 "	24 00	4 00
" " " 50 "	32 50	7 50
" " " 75 "	48 75	11 25
" " " 100 "	65 00	15 00
" " " 200 "	140 00	40 00
" " " 500 "	350 00	100 00
" " " 1000 "	700 00	200 00

INTERMEDIATE CLUBS.

It often happens that clubs are made up of numbers that are not found in the above table. Names may be added to clubs at the following rates :

In clubs of	4	and less than 10..	$1 25	for each name.	
" "	10	" " 15..	1 20	"	"
" "	15	" " 20..	1 10	"	"
" "	20	" " 30..	1 00	"	"
" "	30	" " 40..	95	"	"
" "	40	" " 50..	90	"	"
" "	50	" " 200..	85	"	"
" "	200	" " 500..	80	"	"
" "	500	" " 1000..	80	"	"
" "	1000	and over.....	80	"	"

The Profits of the Cash Business, it will be seen by the above tables, are large and accrue rapidly. Every experienced canvasser knows that it is far easier to obtain 4 subscribers to a paper like THE MANUFACTURER AND BUILDER at $1 50 each than to get 1 subscriber to a high-priced magazine, costing $6. This is more strikingly evident when the fact is taken into consideration that our paper, costing only $1 50, is ACTUALLY SUPERIOR IN EVERY RESPECT TO ANY THING OF THE KIND IN THE COUNTRY COSTING TWICE THAT SUM.

There is another point in favor of our Magazine, as compared with a higher-priced periodical. This is the well-known fact, that in a manufacturing establishment, or even in a town, the working-men will rarely look at a paper costing $3 or $6, and the result is that only rich persons, comparatively, and proprietors can be solicited with any success. Now, these persons are scarce in any community; and a paper that comes within the means and comprehension of the masses or majority of the people, of course commands an immensely wide field. Hence, instead of getting only the proprietor of a manufactory, or the rich men of a town, the working-men can be approached with success; and out of a single establishment as many as 100 subscribers have easily been obtained. This is a very important point to canvassers, and where the large profits with but little effort come in. Try it.

Make all drafts, money orders, and registered letters payable to the order of WESTERN & COMPANY, Publishers, and address all communications,

WESTERN & CO., Publishers,
"The Manufacturer and Builder,"
37 Park Row, New York.

Substantial Success Based on Merit!

THE
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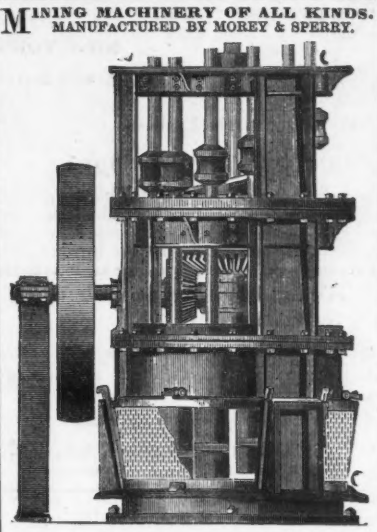

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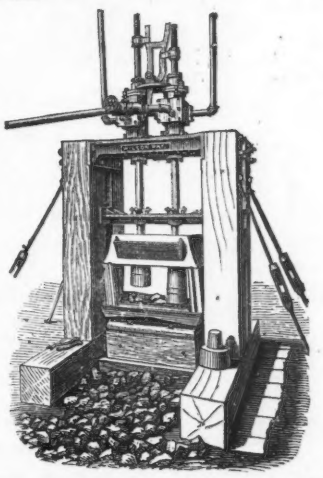

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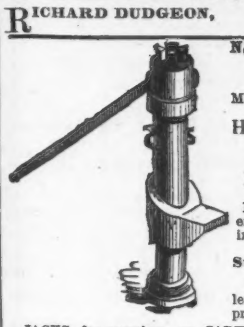

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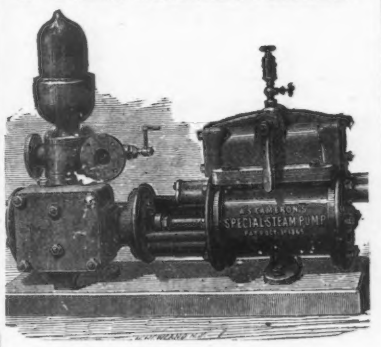

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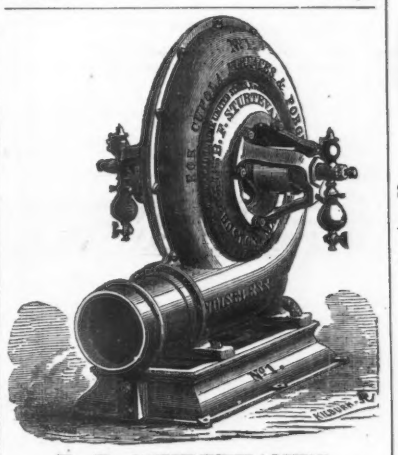

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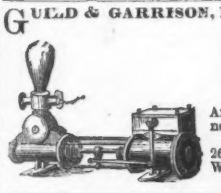

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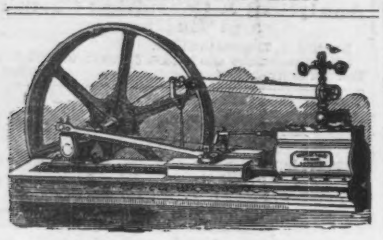

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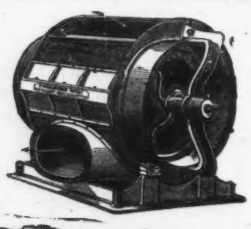

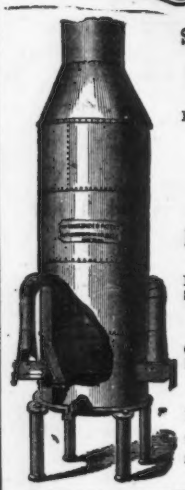

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